

A NEW  
TREATISE  
OF  
Natural Philosophy,  
Free'd from the  
INTRICACIES  
OF THE  
SCHOOLS.

Adorned with many Curious Experiments  
both Medicinal and Chymical,

AS ALSO

With Several Observations useful for  
the Health of the Body;

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LONDON,

Printed by R. E. for J. Hindmarsh, at  
the Golden-Ball over against the Royal  
Exchange in Cornhill. 1687.

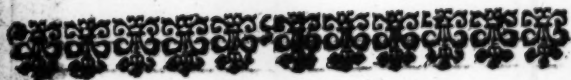
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L I C E N S E D,

*October 28. 1686.*

R O B E R T M I D G L E Y.





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# NATURAL PHILOSOPHY;

O R,

## Natural Science

F R E E D F R O M

The Intricacies of the Schools.

**T**HE desire of Knowledge is natural to Man, Curiosity is inseparable from his Spirit, neither is he ever at rest, until he hath attained to the perfect knowledge of things, that is, until he becomes a Wise Man.

Science is the Knowledge of things by their Causes; therefore there is no Man Wise, who is ignorant of the Original Principles, and Causes of all things occurring to him; and since it is impossible for any Man in this Life to attain to a clear, distinct, and an undubitable knowledge of all things; therefore there is no Man that is absolutely Wise: Those who have the Reputation of being Wise and Excel-

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lent *Philosophers*, have obtained that preheminance, in regard they are less ignorant than others.

Sciences differ according to the diversity of Mens Conditions and Professions. The Noble Man is conversant and wise in the Art of War, the Physitian in the Precepts of *Medicine*, and the Advocate in matters of Law and Right, but all these Sciences (nay *Theology* it self) cannot subsist without *Philosophy*, especially, without that part of it, which we call *Physick*, or natural Science.

*The First Part of Physick, wherein is Treated of the Causes and Principles of Nature.*

**B**Y Nature is understood the Universe, composed of Heaven and Earth, and all that is found between both; this is the Object of *Physick*, this every natural *Philosopher* ought to know; and because this Knowledge cannot be obtained, without knowing the principles and causes of things, hence it is evident, that a Natural *Philosopher* ought to use his utmost endeavour to enquire into the principles and causes of Nature, and of all things which happen in this World.

I shall not examine here, whether there be any difference betwixt a Cause and a Principle ; for every principle, after its manner, I conceive to be a cause of that thing whereof it is the principle, and no Man doubts but every cause is a principle, and that all niceties concerning this matter are altogether useless.

*Philosophers* do commonly reckon all Causes to be but Five in number ; they give the first place to that which they call the *Efficient Cause*, which is that Agent which produces the things that are in Nature ; and gives them their essence and existences : In the next place, they rank the *Material Cause*, being that subject, which receives the impression of the efficient and operating cause. The third is called the *Formal Cause*, which gives a being to every thing, as the most Noble and principal part of it. The fourth is called the *Exemplary Cause*, according to whose rule the efficient produces its action, when it operates by Knowledge. The fifth and last is the *Final Cause*, which is the end, for whose sake the efficient produces its effect. In this first Part we shall speak of all things which concern these several Causes, not omitting any thing which shall be thought necessary to the knowledge of them.

## C H A P. I.

*Of the Efficient Cause, and of its Essence  
and Differences.*

**T**Here is such a relation and connection between the Cause and the Effect, that we cannot have a true notion of the cause, unless at the same time we have a conception of the effect; so in general, we say, that a cause is nothing else but that which gives being to another thing, which is the effect of it; which way soever it happens, according to the Five Causes before mentioned.

All *Philosophers* do agree, That of all Causes the Efficient is the most Noble; because, properly speaking, this alone hath Effect, though it be produced after several ways, as we shall shew hereafter.

If the Efficient Cause acts by a power proper to it self, then it is called the Principal cause; but if onely by the force and impression of another, then it is termed the Instrumental cause: So we distinguish betwixt the *Painter*, and the *Pencil*; though both contribute to the production of the Picture.

Also the Universal Cause, which produces

duces many effects (as the Sun, the Stars, and the Elements) is distinguished from a Particular Cause, which is determinate to one effect in particular: Of this kind there are many sublunary causes acting in this inferior World.

There is also a difference between the Total Cause, which produces its effect without the help of another, and That Cause which cannot act alone, but only produces part of the effect.

There are also necessary and free causes, the first acts necessarily and without choice; as Fire, the Sun, and all created causes, except Men and Angels, for they act by a Free Will, wherein consists the essence of Liberty.

The Efficient Cause is likewise either Physical, or Moral; the Physical acts really and immediately, as Fire consuming a House with its Flame; and he that sets fire to it for that purpose, is the next moral cause; and he who advises it, is a moral, but a remote cause, of the consequential burning. But if the Fire happens by chance, and by the imprudence of one that carries a Candle in his hand, and some sparks fall into the thatch, which takes fire, whereby the House is burnt; here this Man is only an accidental cause of the Burning.

Lastly, it is rightly distinguished between the First Cause, which is Author of Nature; and Nature created, under which are comprehended all second causes, and such are all Creatures.

As to the Efficient Cause whereof we speak, it may be observed, that when it acts by Knowledge, all the said causes, after their respective manner, do concur to the production of one and the same effect: As, the *Painter* drawing his Picture, is the principal cause, the Pencil the instrumental, the End proposed by the *Painter* is the final cause, and the Idea directing, is the exemplary cause; the form and disposition of the parts of the Piece that is painted, may be taken for the form of it, the Colours, and the Cloath whereupon they are laid, may be reckoned the material cause, because they are the constituent matter of the Work. But if a *Linner* in his anger throws his Pencil (as it is reported to have hapned to him who had in vain endeavoured to represent to the life a high mettled Horse Foaming at his Mouth) or if a *Linner* undesignedly and by chance touches the Picture, which thereby (as it befell the former in his anger) is made better, the representation more agreeable, the lines stronger, or more piercing, this would be



be only an effect of an accidental cause.

There are some things to be observed in an efficient cause (when it acts) which are inseparable from it, such as these, the nature of the Agent, the existence of the cause, the power which makes it act, the intervening act, the effect which is produced, the subject whereby, into which, and wherein it is produced; as we shall see in what follows.

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## CHAP. II.

### *Of the first Cause.*

**T**HE existence of the first Cause, or first Principle, is so evident, and so necessary, that it is like Truth known by it self, and ought not to be supposed liable to any difficulty; especially amongst Christians, who are illuminated by the Light of Divine Revelation. And since a Man that submits himself to Faith, hath not thereby renounced the light of Reason, it will not be amiss to confirm this truth with natural reasons, lest any doubt should remain in Spirits less tractable.

Which the better to effect, I suppose a Truth so well known, that no Man can deny, unless he hath a mind to be

thought ridiculous and infatuated.

This Truth so obvious, that it ought to pass for a Principle, whereupon, as a sure foundation, the existence of the first cause ought to be built, is grounded upon our own proper existence ; there is nothing so evident, nothing so certain, than *That we are in the World* ; this truth is confirmed by the testimony of all our senses ; whatsoever we think, whatsoever we say, and whatsoever we do, will not suffer us to imagine that our existence is an illusion : Therefore it is certain, and more than evident, that we are in the World ; but that we are in it from our selves, or by our selves, or by casualty or chance, or by the necessity of being, is absolutely impossible ; so that it is necessary that we are in the World, by the means and assistance of a certain other Being, who as the Author, was also the free Principle of that essence which we possess.

This Principle is necessarily either a first or second cause ; if the first, then you shall see that we are agreed, and that the true existence of the first cause, which some would deny, is rightly built upon the truth of our Being, which no Man can deny ; if we make the cause of our being to be a second cause, then it must be

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be confessed, that this second cause is produced by a third, and the third by a fourth, and so in going upwards, as they do in the Genealogies of ancient and Noble Progenies, at last we find the head of the Family; that is, the first cause, who by his great Atchievements, purchased to himself the Quality and Title of Nobility, and left those Titles to his Illustrious Family. It is likewise true, that there is no Family so Illustrious or so Ancient, but the Genealogy of it terminates in one private person, who gave it both its Name, and Original, and which was the first Cause of its Nobility; no certainly, unless we erect a ridiculous and an infinite Genealogie; or, like the *Egyptians* who imagined themselves to be older than the Moon, will say that its Origine is as unknown as the Head of *Nilus*. In the same manner, after we have by way of ascent to our Fathers, and Ancestors, examined what kind of Author we had of our being, whom we may call the first cause of all things which are in us, we do necessarily find a certain Being, which was before all things, and which is the effect of no other causes, and which is the Cause of all things which are in the World, and consequentially the first, who is that God whom we adore.

This demonstration doth abundantly convince any Person, who hath in him the least spark of the light of reason : It is ridiculous to say, that we our selves were the cause of our Being, because from thence it would follow, that we did exist before we had a being, that we gave our selves that which we were not in possession of, and that the cause and the effect was one and the same thing, which is impossible. It is no less an error to affirm, That we are in the World by Necessity; for if we were so in the World, our existence would never have had a beginning, and we would have been immutable and independent, and infinite in every kind of perfection, which is repugnant to experience and right Reason.

That perswasion of *Epicurus* and his Followers is no less ridiculous, That the first Authors of our existence were produced by Chance, or by a fortuitous occurrence of *Atoms*. This opinion of it self falls to the ground. Let it be supposed, that the World was produced by this fortuitous occurrence of *Atoms*, yet still the question will be, Whether these *Atoms* were Created, or Uncreated ? If created, they acknowledge a Cause of their existence, and this cause must own another, and so *ad infinitum*; which cannot be main-

maintained ; for then the World would be eternal, and thence to this present time, there would have been an infinite number of rational Souls in the World : *Aristotle* who supposed the eternity of the World, and the immortality of the Soul ; yet did deny the Transmigration of Souls, and would allow nothing in Nature to be actually infinite ; whereby he makes himself guilty of an absurd contradiction.

The same *Aristotle* stumbles upon another Contradiction, in Relation to the First Cause ; for if the World be Eternal and without a beginning, this Second Cause is of no use ; for the same Reason which proves the World to have a beginning, proves likewise the existence of the first cause ; on the other hand, the same reason which proves the existence of the first cause, does at the same time prove, that the World once had a beginning ; and doth demonstrate that it was not Eternal.

In the same manner, *Epicurus* is guilty of an absurd contradiction, when he says, that Atoms, ( which, according to his opinion, he makes to be the causes of all things ) were produced and created by another : But if he says these Atoms were Uncreated, and that they were Eternal Beings, necessary

necessary and independent; then every Atom must be some Divinity, and that they are both the efficient and material cause of all things, which is impossible, because the opposition and relation, which is necessarily betwixt a principle acting, and the subject whereupon it acts, do imply a necessary distinction.

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### C H A P. III.

#### *The Perfections of the first Cause.*

**T**HEY who are throughly satisfied with the existence of the first cause, must of necessity attribute to it all the Perfections which are or can be in the World; that it is not only the most perfect and most noble of causes, but also it ought to be supposed, that all the effects which it hath produced, or is yet capable of producing, are in its Being in all perfections, and that every one of them is infinite, and (as it is the first cause) in the unity of its Being; for it is necessary it should have the perfections of those beings which it hath, or can produce; for otherwise, it would or could communicate that which it neither hath, nor can have.

The first cause would not be absolutely perfect,

perfect, if it were not eternal; for so it would have had a beginning, and might have an end; and then it could not be the first cause, in so much that it derives its existence from that which was pre-existent to it; and by consequence, this cause which we suppose to be first, would be a second cause, limited in its being and perfections, as in its duration, and it would seem to have a dependence upon another: Whereas, when we suppose it to be the first, all others must depend upon it, and be subordinate to it; whence it follows, that these qualities of the first cause are inseparable from it, Independence, Eternity, Infinity, and Supreme Authority, and that we cannot conceive any first cause, but at the same time we acknowledge the existence of God.

This first Cause, or to say better, this first Being, which is God, must necessarily have that perfect Unity which admits no multiplication either of Nature or Perfections. Certainly, if God was not one in his being, but had several Natures, the number of them ought to be infinite, and that none of these Beings in particular would be infinite, because when the perfection of one cannot be the perfection of another, there will not be one to be found but will stand in need of the perfection

perfection of the other, that is, in whom there would not be requisite that perfection which the other Beings do possess.

I add moreover, That all these supposed Beings would be opposite, independent, and all Supreme, which is impossible; or that all would be subject to one or other of them, which is ridiculous; whence it follows, that there is but one only God, who is one in his existence, incapable of any multiplication, and who is the Primary and Universal Cause of all things.

X The great number, or rather the infinity of perfections, which we apprehend to be in the First Cause, is not repugnant to the Supreme Unity, because that does not divide the being; and they are but one and the same thing, though we give them several Names, and do consider them under several Ideas, which we are forced to correct, since without that Unity there would be necessarily a composition of parts, which would be the cause of the whole Compound, and which would precede its existence, which cannot be the ingredient of that composition without something else intervening; they might also be divided and separated; so, by the dissolution of the

X you have just observed there can be parts, no multiplication of perfections - or can there be it



creatures may be comprised within the single  
proposition of "I am" ( 15 )

parts, the compound would cease, which  
is plainly inconsistent with that Idea  
which we have of God, who is simple  
in his Nature, Independent, and every  
way Incorruptible.

The first cause is not only One, and  
without its like in its Essence, but also  
one, sole, and without a second, in that  
action by which the world was produced:  
And for this reason this action is called  
Creation, supposing nothing but meer  
nothing out of which all things were  
made by the only power of God, with-  
out the help of any other, having either  
the quality of an Agent or a Subject.

The world being produced by this first  
cause, remains subject to the will and  
pleasure of it. And in the same manner  
as it was produced by the sole act of this  
first cause, so it is preserved in the same  
State by the sole influence of the same  
cause, who as it did not want any other  
second cause in the Creation of the Uni-  
verse, so neither doth it stand in need  
of any assistance in the conservation  
of it.

Being and Nothing are so opposite to  
one another, that the Philosophers al-  
ways had it for a Maxim, That out of  
nothing nothing could be made; which is  
to be understood only in reference to

second

is only by seeing the Deity has an  
independent of them we conceive of him as

our every day practice contradicts for having  
the power of his dominion of creation  
our every day practice contradicts for having  
the power of his dominion of creation  
our every day practice contradicts for having  
the power of his dominion of creation

*A. Consequently necessary - He said has*  
(16)

second causes; and not in respect of the first, whose power is infinite, and who can do what he pleases; this power in the creation of the Universe was not applied according to the extensiveness of its activity, because it pleased God to terminate the being, qualities, and number of second causes, which are created.

The Creation was no necessary action, for the first Cause did not Create the World but at such a Time, in such a Place, and in such a Manner as seemed good to it self; so it made all those things with the highest Liberty, there being no other cause either equal or superior to it self, who was able to compel, perswade, animate, or incite it to the Creation of the world.

The World it self could not terminate a necessary action, because it could not be Eternal, for every thing that is of necessity is eternal, neither had it ever a beginning, nor can it have an end, because it is against the nature of a created being, which is limited in its qualities and duration, no less than in its natural Substance.

If the first cause was free in the Creation of the world, thence it follows, that all things were made by direction of rea-

*eternal emanations only from an eternal son  
being can do this - God united alone eternally*

*These arguments I give not the efficacy of our finite understanding, but the necessity of the first cause being free in the creation of the world, and the necessity of the first cause being free in the creation of the world, and the necessity of the first cause being free in the creation of the world.*

any thing, as if there were the idea of independent  
reason & nothing as ( 17 ) the contrary but

son and understanding, and by consequence, according to a certain Idea and Rule: But because the first cause operates after an independent manner, it could not have the Type of its production any where else but from it self, neither could it act by a rule distinct from its own being; so God is not only the efficient, but the exemplary cause of all things.

For the same reason it may be said, That the first Cause, which is God, is the final cause of all things, for when he, as an intelligent and free cause, produced the World, he did propose to himself an end answerable to his Dignity, that is, himself and his own proper Glory; so that the first cause is necessarily the ultimate end of all its effects.

## CHAP. IV.

### Of second Causes, and their Actions.

**A**LL Creatures are called second Causes, because they depend upon the first, neither do they operate but by the Command and Impression of the first; this First or Universal Cause does act Universally with particular Causes, but after a manner agreeing with the

Creation must have been a creature - Nature  
itself of year being created & consequent

nothing, but his own proposition - If they were all independent beings  
his mind is a change of mind & of

*The Sun - The whole Heavens are Acted by them  
God or what he is (18) (I mean like the*

Nature of every particular thing, and according to the power which was given it when it was created; which does not alter the Nature of the Causes, nor the necessity or Liberty of their actions.

This power of acting, which is granted to second Causes, is not a quality different from their Nature and Being: So the Power which the Atoms have of moving themselves, doth not differ from the Atoms themselves; the power of burning or heating doth not differ from the Fire to which it is inherent, unless it be in the manner of our conceiving things, and of speaking of them according to our conceptions.

So it is of an Action which terminates from the cause to the effect, and which is nothing else than a certain relation, or an actual subordination, which is found betwixt the cause and the effect.

This action is never without motion, or to say better, action and motion is one and the same thing, thence it is that a thing rests when it is without action, and then it begins to move it self when it begins action; so according to three ways of acting, there are found in the nature of things three kinds of motion.

The first is made without Sense or Reason, which we may see in Stones, Metals, &c. they do not presume to describe from  
following conviction it is undeniable but we

to be compared of inanimate emanation from  
 body of God by sense ( 19 ) e the Sun in respect  
 of other planets (which) may be an inferior  
 als, Plants, and the Heavens. The  
 second kind of motion is made by sense  
 and knowledge, as are seen in all living  
 Creatures: The third kind joins Reason  
 to Sense, as we observe in man acting by  
 Phancy, who proposes an end to himself;  
 distinguishes between Good and Evil,  
 and hath the liberty of prosecuting the  
 several Objects presented to his view  
 either with love or hatred.

As an action is not indeed distinct from  
 the cause acting, nor from the effect  
 which it doth produce, so motion doth  
 not differ from the thing moved, or  
 from the thing which moves it, but both  
 of them Is, accordingly as they change  
 their condition, or cease to rest, which  
 from the Creation was never done, with-  
 out a certain local motion of the whole,  
 or some part thereof; so, the notion of  
 rest is opposite to the notion of muta-  
 tion and action, as well as motion.

A comparison from that body that gives  
 light & life to all animate & inanimate  
 CHAP. V.

### Of Accidental Causes.

There are many causes which are cal-  
 led Accidental Causes, for, properly  
 speaking, they are not true causes; which  
 may collect their most exalted nature  
 of it from the respect & relation they pay to

to be compared of inanimate emanation from  
 body of God by sense ( 19 ) e the Sun in respect  
 of other planets (which) may be an inferior  
 als, Plants, and the Heavens. The  
 second kind of motion is made by sense  
 and knowledge, as are seen in all living  
 Creatures: The third kind joins Reason  
 to Sense, as we observe in man acting by  
 Phancy, who proposes an end to himself;  
 distinguishes between Good and Evil,  
 and hath the liberty of prosecuting the  
 several Objects presented to his view  
 either with love or hatred.

sort of causes happens four manner of ways ; first, a *Musitian* draws a Picture, not as he is a *Musitian*, but as a *Painter*; so that the Art of Painting is the true cause of this work : And as the Art of Singing contributes nothing here, since it falls out by chance, that the Art of Singing, and the Art of Painting meet together in this Man, and since the Art of Singing is no way requisite for the making of the Picture ; in this respect, we may say, that the Musitian is only an accidental cause of the Picture which he hath drawn.

Secondly, a remote or indirect cause is called an accidental cause ; as when we say, that the Sun is the cause of darkness, because darkness is occasioned by the absence of the Sun ; Mirth is the cause of Sadness, and Peace arises from War : As a Man endeavouring to save his Friend, whose Life is in danger, and thereby unwillingly exposing him to a certain death, is the indirect or accidental cause of his death : As he, who perswades his Friend to cross the Seas, whereby he is cast away.

Thirdly, an opposite cause (which produces an effect quite contrary to that which it ought to produce) is an accidental cause, as it was with the subjects  
of

of such Tyrants as persecuted the Church, and thereby procured Glory to Martyrs; and as those, who were the death of our Lord Jesus Christ, obtained us Life, destroyed the Synagogue, built the Church; they fulfilled the Prophecies, and laid the foundation of the Gospel.

In the fourth and last place, That is an accidental cause which produces a particular effect not foreseen, and according to the course of Nature unavoidable; if it hath respect to an intelligent cause, and the effect be agreeable to wish, the *Heathens* did point at this by the name of *Fortune*, and according to their way of speaking, we say such a thing is the effect of *Fortune*; as when a Man is digging up the Foundation of a house, and by chance finds a Treasure; but if the effect be otherwise than prosperous, then it is misfortune, or the chance of *Fortune*: As when a Tile falls from the top of a House upon a Mans Head that is passing by, and Kills him; here the Tile is the Phylical and accidental cause of this Mans death, which was inevitable according to the course of second causes, having either their free or necessary motions: The<sup>e</sup> accidental causes gave the *Heathens* occasion to frame to themselves a Blind *Goddeſs*, which they called *Fortune*, to whom they did attribute  
an



an unconstant, an uncertain, and a various disposition of good and evil; to this Man's good, to that Man's prejudice: Of all errors this is not the least, neither was it entertained by any, but the ignorant and the meaner sort of People

The wiser sort in that age did aim at a cause of all the effects which happen in the World, *that was less feigned, and more solid*; this they would have to be Fate, and that what without any reason was ordained by this universal and chief cause was inevitable; so when any great misfortune happened, as the loss of a Battel, the defeat of an Army, the change of State, the subversion of a Common Wealth, or the sudden death of some Illustrious Person; all this was ascribed to Fate; and they did commonly say, *Sic erat in Fatis*, this was the inevitable will of Fate; *so the Fates would have it*: And when any person undertook any great Enterprize, as it was said of *Aeneas*, being in search of the *Golden Fleece*, (if the Fates call thee) that is, if the Fates favour thee; thou shalt attain thy end.

The great Wits of our Age are almost of the same Opinion, concerning all the various successes of Prosperity and Adversity, and all things which come to pass in this Life; as if humane Prudence  
had



had been of no use, and Divine Providence without any care had been idle.

But that we may speak like a Christian Philosopher, supposing the existence of the First Cause, and having demonstrated that it hath all the perfections of the Chief Cause, since Wisdom and Power are the two inseparable perfections of the Supreme Being, and indeed so necessary for the conservation and government of humane affairs; we ought to conclude, that nothing happens in this World, which is not decreed, foreseen, directed, and perfected, by the wisdom; and strong hand of some Supreme Cause, which so exactly directs all things, that they come to pass, according to the end that was proposed in the production of them, and indeed all those things, by means unknown to humane Wisdom; yet notwithstanding, in respect of God, who is the first cause, they are certain and infallible, who established the infallibility of effects, in such manner, that causes in their motion, should be neither forced, nor too violent: There is nothing but what God foresees, nothing but what is absolutely inevitable, and free causes act always freely, in actions which ought to be free.

X This last passage is a proof of the  
 immutability of that then the effect is CHAP.  
 of the immutability of the effect - This is a  
 and carry in our understanding, after what we have

## C H A P. VI.

*Of Sympathy, and Antipathy, and the effects depending upon them.*

**T**He wonderful effects which we see in Nature, whose true and natural causes are not easily found out, obliges *Philosophers* to have recourse to Occult Causes, and to attribute all these effects to natural Sympathy and Antipathy, which happens amongst the several Bodies whereof the World is compounded; but if you press these *Philosophers* to tell you, and to explain wherein this Sympathy and Antipathy doth consist, they will give you no other reason, but onely tell you, they are done by certain occult and unknown causes, to which they ascribe all those effects, whose true causes they do not at all know. But they would do much better, plainly to confess their ignorance, and say they know nothing of the matter.

That we may the better understand what may be said upon a subject so nice and delicate, and give a reason of those wonderful effects which are attributed to Sympathy and Antipathy, without the help of occult causes; in the first place,

I suppose that the difficulty which occurs in explaining an Effect of this nature, doth arise from this ; That the Mind is not able to know the truth of things, but by the Senses, which are the gates through which the Objects enter, and form their Ideas in our understanding ; but because there are abundance of things which escape our senses, it is no wonder, that it is so hard to give a reason of things which are so remote from the reach of our senses ; as for example, *Iron* moves it self, and that by way of local motion, and joins it self to the *Load-stone* ; we do not see that which draws the *Iron* to it, though we see it attracted, but we know not by what ways or means it is done ; but if we explicate this, and such like Effects, by saying they are wrought by Sympathy, obscure and occult causes, we deceive our selves ; for that is only a shelter, and the true way of hiding our ignorance, which we are loath to discover, for there is no man in nature so blockish, but after this manner can resolve all the Phœnomena in the Universe. If it be asked why the Needle turns always to the North Pole ? is it enough to say that there is a Sympathy betwixt this Needle which is touched with the *Load-stone* and the Pole, and that the cause of

X This can stor thoughts with Locke & it is a good  
his work - his Essay was published about this time

this Sympathy is obscure, unsearchable, and past finding out : But if this be the way of *Philosophising*, I refer it to those who are competent Judges of the matter.

Therefore that we may give a more ingenuous and solid Reason, in the second place, I suppose that there are no Bodies but that continually emit certain subtile particles and imperceptible corpuscles which are dispersed through the air, and are at sometimes carried at a great distance, unless they jostle with other Bodies in their way. By the help of this principle, we find the reason why a Dog follows the foot-steps of a Hare, or from a heap of a thousand stones, he readily knows that stone which his Master threw, and picks it out, and by his command brings it to him. From this dispersion of corpuscles, we find the reason how the contagion of the Plague, either from the person infected, or from the wind blowing from that Region, is carried a great way off, as also the reason that the smell of Rosemary is perceivable at a hundred miles distance, as Sir *Kenelme Digby* observes; and likewise the wonderful cure of persons wounds, which are far distant, by the means of the Sympathetick Powder; so likewise of the fermentation of Canary

*In this the result of observation. Wine, Sympathy appears to have no part in it?*

Wine, brought into *England*, which ferment here at the time of their Vintage, when the Vines in *Spain* flourish and are in the budd, and such like. X

I suppose farther, that all these small corpuscles do differ as to their figure and magnitude, and that they are not equally received by this or that body; so one man is infected with the Plague, in the same place where are many others untouched. For the same reason, the beams of the Sun do melt Wax, and not Lead, unless they are collected and united by the help of a Burning-glass, or the like; and the heat of Fire melts Mettals after a very different manner.

Lastly, I suppose that it is somewhat difficult to give a solid and sufficient reason of all the Experiments which daily occur in the nature of things. Truly we are surpris'd with no small admiration, when we see Iron move at the presence of the *Load-stone*, and to approach it, as if it were endued with a kind of sense and knowledge; the *Palm-Tree* of the male kind is barren, unless the female be planted near it, but if they be separated by a river, they both lean to one another, as if they would embrace each other. If you strike the string of a Lute in one corner of a Room, it shall cause

C. 2

the

X, same line in home wide line,

the string of another Lute, tuned to the same heighth, and placed in an opposite  
 X corner, to give a sound; but not another. The Cock always sings and claps his wings in the same moment that the Sun ascends above the Horizon; all Effects which we see from Sympathy afford us matter of admiration, and compel us to acknowledge That Sympathy to be the Daughter of ignorance.

The same thing may be said of Effects which are attributed to Antipathy, no less amazing, and no less difficult to be explained; who can without much difficulty explain the natural aversion that is between the *Colewort*, and *Vine*, so that if it be planted near a Vine, the Vine will give back, and so will the Colewort on the other side? who can give a Reason that Sheep should shun a Wolf though unseen? or that a Drum made of sheeps-skin, should not sound where there is in place another Drum made of a Wolfs-skin? or that when we are seen by a Wolf, before we see him, we are hoarse. who can give a reason that the *Basilisk* should kill by sight? and other Effects of this kind, which are frequently observed. But because that Phœnomena of the *Load-stone* before mentioned, seems to me to be a matter most worthy of consideration,

tion, I shall treat of this subject in a particular Chapter by it self.

## C H A P. VII.

### *Experiments concerning Iron, and the Load-Stone.*

**T**He *Load-stone* is a stone found in Iron Mines, not much different from the Nature of Iron, wherefore the particles which proceed from the *Load-stone*, have a kind of agreeableness with the pores of Iron, so these small corpuscles going out of the *Load-stone*, and meeting with the Iron in the way, do rush into the pores of it by troops; but because all cannot enter at once, a great many remain without, and these are as strongly beaten back by the particles of the Iron which they meet with, as if they were of the number of those corpuscles, which being at liberty, do return of their own accord, which at length do send these by a reflective motion to the *Load-stone* whence they first came: hence it is that Iron is drawn towards the *Load-stone*, principally by the agitation of those minute magnetick corpuscles moved in the concavities of the Iron, and being shaken

together by the sundry motion of those corpuscles which are twisted one within another, those corpuscles which do return, by reflection are complicated and annexed to those which are in the pores of the Iron, or else have passed them through, and cannot be returned or moved towards the *Load-stone*, unless they draw along with them those corpuscles to which they are annexed, and which cannot follow, unless by their motion the Iron be carried with them; so the Iron follows, and is moved towards the *Load-stone*, except the Iron be bigger than the *Load-stone*, for then the corpuscles which proceed from the *Load-stone* are not so many, nor by consequence so powerful, as to draw the Iron, or the impression which they make upon the Iron is not strong enough to cause a renitency to pass that side by which they ought to be beaten back.

This is the reason that the *Load-stone* draws no other Body but Iron, because other Bodies do not return the Atoms, neither are their pores well fitted for those Magnetick corpuscles.

By the same reason it does appear that the *Load-stone* ought not to approach to the Iron, but the Iron to the *Load-stone*: It may be said, that hard and solid Bodies, such as Iron is, cannot emit such a  
great



great number of corpuscles as other Bodies, which like the *Load-stone*, are less solid, and more porous. Also there may be a reason given why the *Load-stone* being rubbed with Garlick, or Oyle, doth not so easily draw Iron to it, especially if you also rub them with it; because these strange corpuscles by their Oyliness do hinder the emission of the corpuscles out of the *Load-stone*, and also their entrance into the Pores of the Iron, and do break their elastick force.

We may observe many other Effects of the *Load-stone*. As for example, That Iron put upon a Table, is moved by the virtue of this Stone which is placed under the Table, for it is certain that the spirit, or corpuscles of the *Load-stone*, which moves the Iron, penetrates through the vacuity or pores of the Table, as if by small and invisible threads it had been tyed to the *Load-stone*; it is the same thing if the Table be of Marble, or Glass, provided it be not greasie, nor too thick; which proves the porosity of Bodies.

We see another Effect of this Stone in a Needle, which being touched by it, always turns towards the Pole, we suppose for this reason, because there are whole Mountains of *Load-stones* found under the Poles, dispersing their spirits through

the Universal World. Spirits which are entangled with those, which do adhere to the Magnetick Needle, whose force is lessened, as the Spirits of it are dissipated; especially if the Compass be set in a place where there are pieces of Iron, to which the spirits stick, and leave the Needle, which had taken no greater quantity of them than what was requisite according to its Capacity.

That which is most wonderful in this Stone is, that we see it draws Iron on one side, and rejects it on the other, so that it appears in every *Load-stone* that there are two Poles of the World; the North Pole attracts Iron, the South Pole repels it; because the Spirit of the North Pole enters in at the Pores of the Iron, but the Southern cannot, for it strikes against the Iron, and drives back too much its Elastick Particles. This Explication presupposes the Being of Spirits, and Atoms, and their Figures and Motions; and as also, small occult vacuities which are dispersed through all Bodies, as we shall shew hereafter.

*This seems strange reasoning - if Make  
a Man by the force of Spirit in the  
Does it follow that a cause behind* CHAP.

*impels him - if the needle is placed to the  
the Magnet to the S. will it not be attracted?*

## C H A P. VIII.

*An Explication of many other Effects,  
which we endeavour to attribute to  
Sympathy.*

I Do not design in this place to shew all the Effects which do proceed from Sympathy, and to give the reason of every one of them in particular; I conceive such a Labour, besides that it is very difficult, is moreover useless, for an Explication of one, will serve to explain the rest; therefore instead of all, it will be sufficient to Explain some few of them.

That which first presents it self to our consideration, is the Sympathetick Powder, the Sympathetick Wood, and the Sympathetick Ointment, an Amulet, and the Medalls, which are of the same Nature, which they call *Talisman*. Sir Kenelm Digby Reports, that the Sympathetick Powder will cure a wound, when the person wounded is distant a hundred, nay two hundred Miles, so that the Cloath be dressed, to which the Matter or Blood sticks which proceeded from the wound; but principally there must be care taken, that the wound be kept clean, and that the Cloath be kept in a temperate place,

*As the wound is acute & remains there long,  
I think the same species of sympathy here  
rejoins to —*

for if it be thrown into a place which is too warm, it will cause an inflammation in the wound; no solid reason can be given of this Phenomenon, so wonderful in it self, but that it is by a continual intercourse of the Spirits proceeding from the Bodies, which by continual motion, are coming and going, and keeping a tie or bond betwixt the Bodies, and though our Senses are too gross to perceive them, it doth not therefore follow, that there are not such things; as it appears by the example of the Spider descending, or ascending, and drawing after him an invisible Thread which proceeds from his Body; so that he being in one end of the Chamber, remains firm and fixed to the other end, by the same thread, by which he bears himself up, and is moved from one part to the other: I confess it is hard to conceive that there should be a Thread of Communication betwixt the Wound, and the Blood which issued from it; But that is neither impossible, nor incomprehensible, though the Phenomenon is not plainly infallible; because this Thread being broke, or interrupted, the wound cannot be cured, unless we take again fresh Blood, and excite it by the means of this Powder, whose Spirits do drive those which are in the Blood, and mixing them-  
selves

*See this when many have been in various ways of the same kind*

selves by the strength of the Powder, do carry and communicate its vertue to the wound, and that at a considerable distance, but not indifferently, not at the distance of a hundred Miles, as it is commonly believed ; it is certain if that were done by Sympathy, the Effect would be the same, at any distance, neither would it ever deceive us.

I cannot produce any more sensible or just reason to explain the Vertues and Effects of the Sympathetick Powder, which depend much upon the due preparation of it ; they do not extend themselves so far, nor are they so infallible, as some would have, for the reasons by us alledged.

The same thing may be said of the Sympathetick Wood, which stops Blood, if a little of the Blood which runs out of the wound be put upon this Wood, where so soon as that Blood is dried the Flux of the other Blood is stanch'd, and this they say is done by Sympathy ; but the true reason proceeds from the invisible adherence whereby both these Bloods are so subtilly connected together by the astringent Vertue of this Wood, and by this Thread of Friendship, composed out of Atoms variously twisted together, communicates it to the Blood which flows  
in

in great quantity, whereupon this Flux, if it be not too vehement, is stopped.

If this Effect did arise from Sympathy it would never deceive us, because nothing can oppose Sympathy; but it is not infallible, as experience shews us.

Of all the Effects which hold us in suspension, that which we call the *Divining-Rod* is not the least, for it is very strange to see a Rod which is held fast in the Hand visibly to incline, and bend it self towards that place where there is any Water or Mettal, and more or less as the Water or Mettal is nearer to the Surface of the Earth, or is more remote from it, and more deep in the ground; and that which is most stupendious, is that this Rod which does it, shews no motion, but in the hands of those who have obtained a particular vertue to this purpose, which distinguishes them from others, though it cannot be said who gave them this power, nor why this Rod hath this motion in the hands of one Man, and not in anothers.

Concerning this Subject, the cause of this motion is to be considered, which cannot be attributed to Sympathy, for Sympathy is a necessary Cause, and then this motion would be always, and in the hands of every body, which yet we see

is not done. Therefore the most natural Cause is to be enquired into, which I deduce from these Mineral or Aquatick Spirits, issuing from those places wherein the Mettals or Waters are; which meeting with the Rod, whose Pores are fitted for them to lay hold on, attracts it by a Perpendicular motion, which is natural to them, and bends it as it were with a Silken Thread, or a Golden Chain.

The difficulty is about the hand which holds the Rod, for every hand is not qualified for this purpose; nor is every Tree fit for it, unless it be Hazel, or some other of the same quality with it: As to the Hand, it is certain that the Hands as well as the Men do differ, and that the Spirits proceeding from them are different, and so it ought not to be looked upon as such a wonder, that there should be Spirits which retain the Rod, and hinders this motion, and that they should proceed from the hand of one, and not from the hand of another; and that every sort of Wood is not fitted to receive the hold of all Atoms. Of portative remedies, which are called Amulets, I say nothing, but what experience taught me concerning them; and of the manner how *Quick-Silver* sticks to *Gold*, and *Sil-*

ver to Copper, which forces me to write a particular Chapter concerning them.

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## C H A P. IX.

*Experiments concerning Portative Remedies, of Quick-Silver, Gold, Silver, and Copper.*

**T**Here are certain Remedies by *Physicians* called Amulets, which give ease to Humane Bodies in many Distempers, as long as the Person carries them about him, as experience teaches us of a Spider shut up in a Nut-shell, and hung about the Neck, is good to cure all Diseases of the Lungs; the true Nephritick Stone being carried about one, cures the Stone; a little Bone of the Thigh heals the Sciatica; Quick-Silver, or a Toad hung about the Neck, is a preservative against the Plague; the Tooth of a Dead Man carried about you shall cure you of the Tooth-ach; Oak-Moss gathered at a certain time, and an Elkes hoof cure the Epilepsie: There are such as preserve Children from having the Small-Pox, and others, which being tied to the wrist cure the Tertian, and Semitertian. So there are many others, whose Effects  
are



are ascribed to occult causes, and to the Sympathy and Antipathy of things.

I do not question the truth of these experiments, because I am certain as to the greatest part of them, having tryed them. Without doubt there are many others which I do not know of, and which nevertheless others might have seen, but this I know, that the aforementioned Effect is not infallible, and when it happens, it is done by the emission of certain Spirits or Atoms proceeding from those Remedies, and penetrating the Pores of Mans Body, and giving strength to the Animal Spirits to resist internal Poysons, or resisting the external Poysons, and fixing and hindring them from hurting those who carry the Amulets; I shall say nothing of Medals, which are called *Talisman*, importing good Luck to those by whom they are carried about them, nor of white Magnets, which procure the kindness of all People, and the favour of a Mistress: I give little credit to such things, neither can I easily believe all things which are said of them; and if Stars ought to have place here, rather than Demons, all is done by the means of Atoms.

Now I come to that which I am better acquainted with, and of which I can speak with more certainty, I mean of  
Experiments

*The Quicksilver must pervade the whole ring.*  
( 40 )

Experiments concerning Quick-silver and Gold; it is certain that if any Man hath Quick-Silver in his Body, or any where about him, that the Gold-Ring which he hath upon his Finger, or which he holds in his Mouth will turn white, because the Quick-Silver sticks to the Gold; and if this Gold-Ring be thrown into the Fire, the Quick-Silver flies and evaporates; and if the same Ring be again put upon the Finger, or held in the Mouth, it will still grow white every time, as long as any Quick-Silver remains in the Body.

This Phenomenon is commonly ascribed to a Sympathy which is betwixt Quick-Silver and Gold; as if the Quick-Silver should hastily go to the Gold and embrace it, or that the Gold did draw the Quick-Silver to it; but Gold enclosed in smooth Glass does not turn white, no more doth it then when Quick-Silver is enclosed hermetically in a Glass, there is no Sympathy to call it forth thence, no more than out of a Box or Bladder wherein it is kept: we ought not therefore to say that it was the Sympathy of these two Mettals which was the only cause by which the one adheres to the other, for though we should grant that there is a Sympathy, that is, an agreeableness, proportion, and likeness between these

*Ther is but one the Quicksilver / reflects it - the silver must pervade the whole ring / otherwise it will not adhere to the Gold.*

so that for if Gold & Silver be dissolved together  
they will not ( 41 ) happen to separate

these two substances, not in their imaginary qualities, but in the figure of their Atoms; nevertheless it must be confessed that the attraction of Quick-Silver to Gold, is by an emission of their Spirits and Corpuscles, near after the same manner as we observed of the Load-Stone and Iron.

There is no less a connexion betwixt Silver which the Chymists call the Moon, and Copper, which they call *Venus*, than there is betwixt *Mercury*, that is in their Dialect, Quicksilver, and the Sun, that is Gold. If one Ounce of Silver be dissolved in three Ounces of *Aqua fortis*, made of *Nitre* and *Vitriol*, the Silver is reduced to Water, neither is it ever after seen, and if we would recover the Silver after such a dissolution, you must take leaves of Copper, and put them into an Earthen Vessel, and pour upon them one pint of common Water, then to this Water put the liquor in which the Silver was dissolved, and it will turn it as white as Milk, and in the space of two or three hours, the Silver will leave the *Aqua fortis*, and joyn it self to the Copper in the form of Curd or white Moss; when the water is clear, throw it all out the silver sticking to the Copper is dried and reduced to a mealy Powder, and this

this is called *Calx Luna*, or Silver Calcined.

As to this, we must take notice, that if in stead of Copper, you put in leaves or pieces of Gold, Silver, Lead or Tin, the Experiment will not answer expectation; neither will Silver stick to them as well as to Gold, whence we must necessarily conclude, that there is a certain Sympathy or peculiar connexion between Silver and Copper, as there is betwixt Gold and Quick-silver, so that we grant, that if the transmutation of Mettals be not impossible, no Mettal can be sooner changed into another, than Copper into Silver, and Mercury into Gold: The difficulty is in knowing the true cause of a Connexion or Affinity which is so remarkable.

It is commonly said to be done by that sympathy or agreeableness which is between these two Mettals. But in saying that, we say nothing, for we must enquire farther into the cause and foundation of this Sympathy, so that we are forced to search for another Cause of this Effect, and to say that Silver is not joined to Copper, but by the means of a certain local motion of the Particles of the Silver, which are dispersed in this great quantity of water, and are congregated to joyn and unite themselves to

to the Copper ; there is no other cause of this local motion, besides the Spirits and scent of the Copper which are dispersed thorow the water, and there meeting with particles of the Silver which are wandring, separated, and dispersed, are fixed to them by reason of the conformity of their Pores ; when the Corpuscles of the Silver are loosed, and set at liberty in the water, they leave it and descend, being forced downwards by the concurring Particles of the Water, and leaving no vacuity, wherein the Particles of the Silver may be contained, they find the Atoms of the Copper, emitting themselves like the Odors of Aromatic Bodies, and mutually entangle one another like little hooks, they go directly towards the Copper, and falls upon it as it lies in the bottom of the Vessel ; this Explication doth imply the Doctrine of Atoms and their figures, weight, and motions, as it shall appear in following Chapters, after we have discoursed of Antipathy.

## C H A P. X.

*Of Natural Phænomena which are attributed to Antipathy.*

**T**Here are observed to be many Effects, for which no Reason can be given without the help of this feigned Antipathy. I'll instance to you some few, which I shall endeavour to explain.

In the first place occurs the sight of the *Basilisk*, who kills all whom he sees, which they say is by Antipathy, which is betwixt it and other Animals. But it may be said rather that it is done by the emission of certain venomous Spirits, which penetrate the Eyes of those which were seen by the *Basilisk*. The nature of this poison cannot be explained, unless we know before what is said of Poisons else-where. I thought that the deadly Effects proceeding, which we attribute to Antipathy, did deserve a particular tract by it self, because Poison kills only by a Contrariety betwixt us and it, so there is nothing more to be said of these matters, only that we are to discover and declare the Principle of this Contrariety: Of the *Basilisk* of whom we speak, I shall only say that the Spirits issu-

ing

ing out of his enraged Eyes, do kill those Animals which they meet with, because the Spirits do penetrate them by their subtilty, and sharp figure, like Needles, which pierces the Heart, as the Poison of *Vipers*, and such like, not so accute, nor so deadly, nor so ready in their effects, as that of the *Basilisk*. In reference to this matter there are many things which occur, that are worth consideration. In the first place, it is certain that the *Basilisk* is not ingendred but in moist, deep, and dark places, as in the bottom of Wells, where there is nothing but muddy, thick, stinking Water, as Histories do relate to us, that some have died only by looking into those Wells, or in going down into them, in order to cleanse them. In the second place, we do observe, that if you take a Glass and hold it against the *Basilisk's* Eyes, those Spirits which issue from his Eyes, reflecting upon the Glass, are sent back from whence they came, and do kill the *Basilisk*: It cannot be said that the *Basilisk* doth hate himself; but it must be said that the Venomous Spirits, reflecting from the Glass, do conceive a more violent motion, and do forcibly enter the Eyes of the *Basilisk*, and do drive back the other Spirits which are issuing out of, or are extant in, his Eyes,

so

so that they penetrate his Brain and Heart, and thence occasion his death. In the same manner, as Vapours do often arise with so great violence from the Hypochondria, the Mesentery, and the Stomach, into the Head, that they cause an *Apoplexy*, *Epilepsie*, *Dizziness*, or *Lethargy*, and sometimes they are carried with such subtilty and violence into the Heart, and presently penetrate it; whereby Men *dye suddenly*.

It is also observed, that several Men, and other Animals were killed by a *Basilisk*, from the corner of a deep and dark Dungeon where he was ingendered, and nourished up to the bigness of a Toad, it was contrived that one should enter into the Dungeon to kill him; care being taken, that he who was to enter for that purpose, should be covered with a Glass before his Eyes, by whose interposition the *Basilisk* might be seen, though he could not see the Person approaching towards him. By this means, he who entered saw the *Basilisk*, and killed him, without receiving any hurt to himself; which without doubt did proceed from this, that the poisonous Spirits issuing from the Eyes of the *Basilisk*, could not pass freely thorough the Glass, but were fixed in the substance of it, so that they could not



not hurt the Person who was so covered.

Another Effect which is ascribed to Antipathy, and must be spoken of in this place; is that which we meet with amongst some Vegetables, as betwixt the Colewort and the Vine, betwixt whom as we observed before, there is not the least agreeableness, and that if they be planted near one another, they do insensibly give back, and lean sideways, as if they really hated one another, This effect cannot be ascribed to any thing but to the emission of the Corpuscles and material Spirits of both of them, which do rush upon one another, and mutually repell by the irregularity of their figures. This truth is apparent in the juice of Coleworts, which if taken by a Man when he is Drunk, he presently comes to himself, and is sober; because the Corpuscles of the juice of Coleworts do blunt the Corpuscles of the juice of Wine; in the same manner, we find by experience that Spirit of Opium, or Laudanum, Cures the Chollick, Head-achs, and all other kind of pains; nay, it eases the Tooth-ache, and blunts the sharpness of Choller; it Cures the Phrenzy, and procures Sleep; so there's need of the greatest care in using the Narcotick Medicines, because it often falls out that the Vital Spirits are so stu-  
pified

pified by them, that they are deprived of their Motion, which causes a deadly Sleep.

But that we may return to our so much believed Antipathy, which is betwixt the Colewort and the Vine, I observe, that it hath not the above mentioned Effect; and that neither the Vine nor the Colewort do lean sidewards, if there be Cloth or Paper set betwixt them; and though the same Antipathy remains, it doth so manifest it self, because the Corpuscles flowing from both sides are stopped in their way, neither do they pass through the Cloath or Paper; So the truth of that assigned by us, and the weakness of that Reason which is grounded upon Antipathy, clearly appears without any further Scrutiny.

There is a Third Effect which is ascribed to Antipathy, and it is observed in the use of Medicines, as well Internal as External; some whereof are Catharticks, some Sudorificks, and others Specificks: The External of which we speak, are those which we carry about us, which by their Antipathy, drive away the Malign air, and preserves from the Plague, and other Contagions; as prepared Quick-Silver, and a Toad dryed and shut up in a Box; this Phenomenon is not in the least

to

to be ascribed to Antipathy, but to the pestiferous Spirits or corpuscles, which approaching towards us, do find Subjects apt for their reception, and are fixed in them, but they do not approach us, at least in such a quantity as is able to hurt us; which most evidently appears, in that Prepared Quick-Silver, or the Toad, being once replenished with these Contagious Atoms, become useless, and they ought to be changed and renewed; and I know by Experience, that Quick-Silver prepared white, and shining like an Adamant, or Polished Silver, and being carried about a Person who is frequent with Sick People, in time becomes black, so that afterwards it is useless to him that carries it about him, because there are no small Vacuities left to retain the airy Poisons, unless he renews it by another Preparation, whereby it may be made as White, Transparent, and as Useful as it was before.

Moreover Quick-Silver turns black, more or less, sooner or slower, according to the proportion of the lesser or greater malignity which is in the air where he lives, because these Antidotes can never hurt; nay, if rightly prepared, they do not only withstand the contagious Air, when they hinder its nearer approach

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towards

towards us ; but as it is evidenced by experience, they do suppress inward Vapours ascending up into the head, which occasion many of our common Distempers: It were to be wished that Sacred Persons, and Princes, whose Lives are so dear unto us, (to the end they might preserve their Health, and not be any way subject to any danger of this kind,) would carry these Antidotes about them, and that those who have free access to those Sacred Persons would advise them to it; and likewise demonstrate the use and vertue of them.

I proceed to Purgative Remedies, This carries off Choller, That Phlegm, Others Melancholly, and Others do Purge the Blood and all the humours. It is hard very often to give a reason why Rubarb and the Leaves of Sena do Purge Melancholly; Jallap and Diagridium purge out Phlegm and waterish humours.

Whether this be done by Sympathy, which attracts the Humours from the several parts, or by Antipathy which expels and exterminates; but it may be said that it is done neither way, and that a matter of so small a moment, did not deserve that strife betwixt the Followers of *Galen*, and *Paracelsus*, for their Axiomes concerning contraries against contraries, and

and like to like, contribute nothing to the explanation of these Effects ; for I take it to be a certain and constant truth, that every purgative Medicine doth comprehend in it certain Spirits or Corpufcles which are venomous, that is acute, sharpned, pungent and biting, fo that Nature being stirred up by them, and thereby the internal Parts and Membranes being touched and agitated, the Animal Spirits get together by troops, in order to affist the part affected, and they draw along with them the foreign Humours, which are lefs fixed ; and then Nature by the help of these Spirits doth discharge it self, and expel them by their proper ways : But to say that Rubarb makes choice of exterminating Choller, or the Leaves of Sena of carrying off Melancholly, is ridiculous. It is true, that after a Purgation with Rubarb, the waters proceeding from the Body are yellow, and after the use of Sena, or Cassia, they are black ; yet it does not follow from thence, that This purges Choller, and That Melancholly ; they are only the superfluous humours which are discharged, neither doth the Body afford any thing, besides that which it hath ; whether Sena or Rubarb be taken, the colour of what is Purged, proceeds from a tincture of these Medicines. D 2 Chap.

## C H A P. XI.

*Of Emeticks, Sudorificks, and Specificks.*

**O**F all Medicinal Remedies those seem most admirable to me, which are called Emeticks or Vomitives, which have in them a great deal of Poison, and likewise abound with Arsenick Spirits; Amongst Minerals, Antimony and Arsenick are of this kind; so are the Herb Asarum, and other Herbs, amongst Vegetables. It is evident that all these Simples and Minerals, consisting for the most part of many sharp and corrosive Corpuscles, do not purge the Body, but by pricking and irritating of the Membranes, and that some times with such vehemency, that the Belly and other contiguous parts being Ulcerated thereby, there happens a breach of the internal continuity, &c. which occasions the death of the Party who is thus affected. It is apparent, that it ought to be acknowledged for a certain truth, that these sort of Medicines ought to be used but very seldome, but if necessity requires the use of them, none but the gentlest are to be applied; it being taken for a constant truth,

truth, that those Persons who use these Remedies too-often, do never enjoy a perfect Health, and that their Lives are always short and crazy.

Let us consider an Emetick, and especially Antimony, which being well prepared, performs wonders: I mean, by a good preparation of it, that it be freed from a great quantity of its pernicious and poisonous Corpuscles. As to this, it ought to be prepared by Judicious Artists, for if it be so ordered, that the Antimony Purges neither upwards nor downwards, and that it retains only a Sudorifick Vertue; being thus qualified, it is very proper, and very useful, to purify the Blood, to increase the Animal Spirits, the natural heat, and radical moisture, for reasons which I shall shew hereafter. But if these Venomous, Arsenick, and corrosive Corpuscles be not separated from the Antimony, it may prove to have very ill effects, in that it imposes violence upon Nature: It is not to be administred but by a prudent and most expert hand; though the substance of it be not taken, but only the Wine wherein it is infused.

But your crude and Diaphoretick Antimony which the late Mr. *De L'orme* called his Milk of Pearls, is very comfortable

ble to Nature, and may be safely used with very good success; but to find the Cause of that Effect, the Learned are very much puzzled. I shall endeavour, according to my Principles, to shew the Reason of this Effect: It is made in this manner, take Crude Antimony, and thereof make a Starry Regulus, which is all as one if it be not Starry; of this melted Regulus you are to make a Cup, put Wine into it in the Evening, pour out the Wine the next Morning, and you will find that it hath lost nothing either of its tast or colour; yet notwithstanding, it is very Purgative. That which is to be admired at, is, that this may be done continually every day, without any remarkable diminution of the Cup, or loss of its Vertues.

If the Wine loses or receives nothing, as it seems it does not, how then can it be Purgative, or Emetick, and if the Cup communicates to it either its substance or Vertue, how then is it possible, that either one or the other is not in the least diminished? According to our Principles I return this answer; That the Wine every time it is put into the Cup, doth take from thence certain Corpuscles, or invisible Spirits, wherewith it is impregnated, and That little is sufficient to give the Wine a Purgative Vertue, and to  
 stir



stir the Membranes of the Ventricle; and the inward Parts, in order to Evacuate the peccant humours; which is evident from this, that the Wine according to the proportion of time it hath stood in the Cup, is either more or less Purgative, though the Cup suffers no sensible diminution in its Substance, yet notwithstanding, it is certain that it will suffer some small diminution in the course of some Years; which it were worth while to observe.

I have spoken above of a Regulus Starry, and not Starry, that I may let the Reader see somewhat that is strange in the Confection of Regulus, when it is well Prepared with *Mars*, that is, with Iron; there is to be seen a great Star upon the upper side of it, which hath Five Rays, like the Rowel of a Spur: I confess that in this strange Phœnomenon there is something that is wonderful, and which is beyond the reach of Humane understanding, especially if we observe, that this Star is more bright, and its Rays better formed, if the Regulus be Prepared either *Tuesday* or *Friday*, especially if the Sky be clear and serene; and if it be made between Seven or Eight of the Clock in the Morning, or Two or three of the Clock in the Afternoon: and that I

may build one Wonderful thing upon another, it is certain, that if in the Preparation of Regulus, Tin be added with Iron, there will be seen two Stars upon the Regulus, with their distinct Rays dispersed into one another, and if the Regulus be driven to the last degree of perfection, the Star disappears, and there is seen in the room of it a little thin Net, like a Fishers Net: I am so far from delivering any thing upon the Credit of others, that I set down nothing but what I my self have done and seen.

Having let you see the manner how it is done; there remains only that I should give such a Reason of it, as may in some measure satisfy the Readers understanding; I do not Brag that I am able to do it, for there are few Men which are rational; I mean who are contented with Reason, nevertheless you shall have my thoughts of the Matter.

No Man doubts but that Iron represents the Planet *Mars*, Copper *Venus*, Gold the *Sun*, Silver the *Moon*, and Tin *Jupiter*; if the Qualities of these Mettals be compared with those of the Planets, as the Heavens do incessantly influence the Earth, and the Earth sends back its Corpuscles to the Heavens in the form of Vapours, in the same manner do the Heavens

vens return them to the Earth in Rain,  
 and Dew; and though there is a general  
 Commerce between the Heavens and the  
 Earth, yet no Man will deny, but that  
 there is a certain invisible and particular  
 Commerce betwixt them; and that we  
 may not speak of things so general, there  
 is a more special Commerce betwixt the  
 Sun and Gold, and betwixt the Moon  
 and Silver, *Mars* and Iron, *Venus* and  
 Copper; so every Planet hath a special  
 influence upon its Mettal, and the Na-  
 ture of it, by the means of the invisible  
 Atoms and Corpuscles which proceed  
 from the Body of the Planet, which plain-  
 ly appears by all the former instances, and  
 amongst the rest, for that the day and  
 hour of the Planet, contributes to the for-  
 mation and perfecting of either the single  
 or double Star, as we have observed about  
 the Starry Regulus. These things being  
 supposed, I conceive that while Anti-  
 mony is Melting with Iron, there is  
 much Vapour and Smoak arising, and  
 this is most certain, that the Smoak e-  
 vaporates in such plenty, that it is trouble-  
 some to the Artist, who is obliged to  
 stand at some distance, if he will have a  
 care of himself: These Vapours and  
 Smoak do ascend up, which being met  
 with by the Spirit and Corpuscles of their  
 Planet,

Planet, do mingle with them, and descend upon the Mettal and penetrate it, because, being melted, it is open.

Therefore these emancipated Spirits do return more pure than they were, and do so well intermix themselves with the open Mettal when it is melted, and that they draw others to stick unto them, whence the Spirit of the Planets, though invisible, descending from the Body of the Planets, not being able to enter into the Regulus when it is removed from the Fire, and begins to coole, are forced to stick upon the upper and superficial part of the Mettal, and there form the Figure of the Planet or Planets from whence they did proceed, and when Copper is put to it, there appears a double Star, and this Star is the more elevated, when the Spirits of the Planets are more copious, which they are at the day and hour wherein the Planet Rules.

All these things agree with experience, for the single or double Star doth not appear till the Mettal begins to cool, which requires about the space of an hour; and this Star is formed by degrees, which is strange, nay, to be wondred at; whence it appears, that there is an agreeableness between *Adams* and Iron, and betwixt *Venus* and Copper, and that there is an in-

influence of their Planets upon these two Mettals by the intervention of their Corpuscles.

As for the Net ( which we spoke of ) it shews the Conjunction of the Planets of both Mettals, having the Sun in the middle, and I am not able to give any other reason for it; unless that when the Mettals, which are melted with the Antimony, begin to grow cold, and that when the Star enters into the Body of the Metal, and disappears, there are still remaining certain Corpuscles of the Planets of both Mettals, which are interwoven in the middle of the Mass, which makes this Net, whereof the Fables seem to leave us an Idea: We must confess by the by, that there are certain things in Nature which surpass our understanding, and that we ought not to imagine with our selves that we are able to satisfy all the Learned in every thing.

But to go on with this Chapter, I observe likewise, as there are Mettals which rejoice at the Commerce which they have with the influence of some Planets, so there are parts found in our Body which correspond with Particular Planets; as the Heart with the *Sun*, the Brain with the *Moon*, the Liver with *Mars*, the Spleen with *Saturn*, the Lungs with *Jupiter*,

ter, and the Reins with *Venus*; so we see that Gold, which is the Terrestrial Sun, is a Sovereign Cordial, or a Medicine for the Heart, and truly universally for all Bodies, as the Cœlestial Sun is for the whole World; as I shall shew when I come to discourse of Mettals Silver in the same manner is a Cephalick Medicine, whereof are made wonderful Remedies for Diseases in the Head; the same may be said of Iron in respect of the Liver, when it opens its obstructions, and fortifies; Copper affords a Spirit which wonderfully heals the Reins, and also Venereal Distempers. I shall speak something of every Mettal in its proper place, and we shall more plainly see how every Mettal doth administer a Specifick Remedy for that part which it hath relation to, as experience shews.

As for Sudorificks, I will not speak of them Medicinally in this place, neither will I explain the matter whereof those Remedies, so beneficial to Mans Body, are made. It is sufficient for me to speak of them Philosophically; and it being supposed (which I have not seldom seen) that one only Grain of Powder plainly insipid, and of the Colour of calcined Gold, given in half a Glass of Wine, doth provoke Sweat in abundance from  
the.

the whole Body from head to foot, without any violence or alteration: This I have seen, and have done it, and can do it again at any time when I please. Nothing remains, but that I should give the Reason of this Phœnomenon, and that we know whether it ought to be attributed to Sympathy or Antipathy.

I suppose, and I know it very well, that this Powder is compounded of the Spirit of Gold, and all other Mettals reduced into one; so that it ought not to be admired, that the Atoms of which it is composed should be so penetrating, that they are carried from the Stomach, through the whole Body, and that in their passage they fix the most subtile Corpuscles of humours, which pass through the Pores in the likeness of Vapours, and meeting with the cold outward air are reduced to the likeness of Dew, which is called Sweat. There are other Sudorifick Powders, but they are more violent, because they are less subtile, and less penetrating, and whose Atoms are not so apt to rarifie the Humours, and to draw them to the extrem parts of the Body with so much facility, and with so little danger, as that doth which we spoke of before

## C H A P. XII.

*Of Poisons, and Toxicks.*

**T**Here are several sorts of Poisons and Toxicks; some whereof do come at us with an infected air, others are communicated to us from Animals, or some Nutriment. It is not my purpose in this place to shew all the differences of them. It answers my purpose to reduce them to Five, from the occasion of those things which I ought to speak of, about the Antipathy that is betwixt Poisons and our Bodies.

Therefore I chuse three kinds of Poisons or Toxicks, and I shall endeavour to explain the manner how they act upon our Bodies with the assistance of that fictitious Antipathy, the Refuge of Ignorance: The first is the Poison of the Heart, because it immediately assails this Part; such is the Poison of a Viper, or the Plague, the breathing of the infectious air draws and conveys the Plague to the Heart; since we cannot say that the Air is carried into the Heart by a contrary quality, whence therefore doth this arise from Antipathy, or Repugnancy? And after what manner doth the air, which



Yt happens to be a rare disease, which we no longer - person in the history of health -  
we seem to have lost by a popular method of disease. There is no one above the clouds -

Yt happens to be a rare disease, which we no longer - person in the history of health -  
we seem to have lost by a popular method of disease. There is no one above the clouds -

not hitherto been mentioned by any Body, which is, *That Poison is nothing else but certain loose and emancipated Atoms*, for many of such Atoms being loosed and separated from the Body we call Poison.

As to that, we are to observe, that being compounded in that manner which we are, our conservation doth consist in the composition, and as long as that lasts we live, and so our destruction doth proceed from the division and dissolution of our Bodies, so that *Corruption is nothing but a solution of the Body*: This solution doth not happen but from emancipated Atoms, who by their incomprehensible subtilty, do find an intermediant space in the most solid Bodies, and if these be not speedily driven out and dissipated, or are repelled by certain aiding Corpuscles, they will occasion Diseases, Grievs, and lastly Death.

Therefore Poison is not a pestiferous quality, nor is it the Antipathy of the air, or of any thing, whereby they persecute our Temperament; nor is it corrupted Air, but they are hard Atoms which are set at liberty, and emancipated; whence it does appear, how the Plague may be brought to us from places remote within a short space of time, and how it may lye hid along while amongst Cloaths

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in Chests; also the Reason is obvious, why Bleeding and Purgation are not necessary in the Curing of the Plague, and why only Cordials and Sudorificks are convenient in a Contagion.

The same thing may be said of the Poison of Vipers, which is nothing else but some Atoms divided and separated from the whole, which entring that part which is Bit by the Viper, do creep presently through the whole Body, and divide, separate, and cut it, and at last dissolve and confound it. It is therefore incredible, that that Poison should proceed from a Great Cold, because there are Bodies which are much colder, which yet are not Poison; besides that cold doth not so readily, nor from so small a beginning, destroy the whole Natural constitution of Man's Body.

Therefore I take that to be which wholly destroys us, is to dissolve our Body, and that nothing can dissolve it but free'd and emancipated Atoms, whence Distempers do derive their Original, and Death, the consequence of it: I say it follows, that it is impossible but that there is Poison in all our Diseases, and that we cannot enjoy a full and perfect Health, as long as we have in us the least Atom of that kind, which I say are emancipated; these

these are so many Enemies which we cherish in our Bosome, being the Principles of Division, Dissolution, and Death.

But some will ask, whence come these emancipated Atoms? who emancipates them? and after what manner are they found in the Vesicle, which is broke, where the Viper Bites, or in the Spittle which enters our Flesh by the Biting of this Creature? I answer, That they are Atoms not firmly complicated, which get abroad, or they proceed from some dead Body which is dissolved into its first principles, as it happens with the Plague; some of them get loose, like Servants who wanting a Master, do seek to be busied and employed in some business, and as long as they stick to no body they may be called desolate and depraved Atoms, which are continually moved, drive others, and dissolve them by their reiterated concussions; so a little Poyson doth suddenly extend and disperse it self through the whole Body, because these Atoms by their emancipation being made Venomous and Pestiferous to Emancipate others, and confound the whole Body, and in this sense it's most true, what the Physicans say, that the corrupt Humours of the Body do degenerate into  
Poison,

Poison, because these moist parts of our Body are more apt to break and divide than the solid parts of it; they are also the first which begin to be corrupted and divided. I know not by what instinct of Nature we commonly say when we apprehend any Distemper, that we are ill Composed, and of a Body that is Crazy and full of Humours, that is wholly ill Disposed, because in truth the emancipated Atoms do disturb it, and hinder the Union and Composition of its Parts, wherein the state of perfect Health doth consist.

Some will say that I have handled this Matter after a strange and odd kind of Method, but if Truth and Reason confirm my Explication, as I hope it does, they have nothing to say against me, but I speak those things which were never said before; or that I do not proceed in the same manner, and the same Course in the Progress of this Philosophical Tract; wherein I will sincerely endeavour to bind my self up to the Truth, without having any Regard to the Prejudices of the Schools.

I return to Poisons, and after I have Discoursed of Pestiferous and Viperine Poison which attacks the Heart, it will be time to say something of those which  
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immediately invade the Brain, and from thence the Heart, the Center of Life, before I address my self to either general, or particular Antidotes, which deserve a particular Chapter by themselves.

Therefore I say according to the common Opinion of Physicians, That there are Toxicks and Poisons which immediately beset the Heart; as I have said of the Pestiferous and Viperine poison, and others like them, there are others which attack the Head, such as the biting of a mad Dog, *Opium*, *Solan*, and other Narcotick and somniferous Simples. There are also Poisons which rush into the Liver, and corrupt the whole Mass of Blood, as the Venereal poison, and others of the same kind. Th s diversity is ascribed to Antipathy, and an Aversion, whereby Poisons are carried to certain parts of our Body, but the foundation must be shewed, whereupon this Antipathy is built; *the water sticks*, neither can any solid reason be given, why the Poison of a mad Dog attacks the head, or that of the Viper, the Heart; Besides that this Antipathy is not sufficient to explain the Nature of Poisons, though we may confess, that they have an aversion to our Nature, because they endeavour the destruction of it, and do procure

cure the separation and division of our Bodies.

It being supposed (as indeed it is) that a Mad Dog biting a certain part of our Body, doth leave in that part a certain Spittle or Foam, which enters the wound (for unless there be a Wound, there is no fear of danger) the venomous Atoms being dissolved and emancipated, and as it were raving mad, do insensibly and by degrees creep through the parts of the Body, and finding no softer parts than the substance of the Brain, and by consequence easier to be divided and destroyed, do produce the dissolution of it; and therefore it must be granted; that if the Brain could not so easily be dissolved, and that the fluidity of its substance were not the reason why it so easily receives the impression, that is the action and motion of the emancipated Atoms; the poison of a mad Dog would produce but little disturbance in us. It must not be said that that poison ascends the Head by Sympathy, and ruins it by Antipathy; but according to our Principles, it ought to be confessed, that the Atoms of the spittle of the mad Dog, being loosed and emancipated, are as apt to destroy the other parts as well as the Brain, if the Substance of the brain did not consist of cer-

tain

*The animal by a spirit in that part may be affected. I saw a viper bite in rage. The head may thus be affected.*

*in figure of the animal and directed from inward muscles of the body and not from the outward*

tain Corpuscles, yielding to these foreign Corpuscles, whereby they enter into the vacant spaces of them, which having entred in at these little chinks or fissures, they raise a Tumult and confusion in the Castle.

✕ This truth is evident in slow poisons, which stagnate as well as that whereof we speak, until the emancipated Atoms of it find out some part, whose Vacuities give them free entrance, or they meet with some Corpuscles, whose little Hooks or Angles do either accelerate or retard their motion: For these emancipated Atoms being not received nor fixed, but by weak Corpuscles, are like a Bird having only his feet entangled in the Birdlime, endeavours with all his strength to get himself free, or like a Man, who is to be thrown into Prison, and is withheld only by one Arm, uses his utmost endeavour to obtain his liberty; so it is with free and emancipated Atoms, which are partly withheld by these tender little Hooks, whereof the Brain doth consist, whence arises a furious agitation in the Brain it self, and at length madness; for indeed the madness is in the Dogs Brain, to which some emancipated Atoms came from abroad, or from some dead Carrion which the

*The passion of the Dog by its intense heat* Dog



Dog did eat, or from the Air in the Dog-days, being then too much rarified, or from too much dryness of the Brain, proceeding from too much drowth, and these Atoms go forth with the Spittle, when the Dog bites some part of our Body, and in time produces the same confusion with that in the Dog.

The third sort of Poison which I promised to speak of, is that of the Venereal Disease, which sets upon the Liver, and without a prolix declaration of the external causes which produce it, it will be sufficient for me, if I will declare in few words, that which is necessary to know, wherein they do consist, and why Poison is so pernicious, that it corrupts the Liver, and infects the whole Mass of Blood, and afterwards, tho' slowly, ruins the whole Constitution of the Body, and the Oeconomy of its constituent Parts.

It is frivolous to say, that the Venereal Disease and its Poyson, doth consist in an Antipathy to the Liver, and the Mass of Blood, for the Cause and Nature of this feigned Antipathy, cannot be assigned. But in my Opinion there is no difficulty in the matter, for by the common consent of Physicians, this Poison is nothing else but a malign quality, proceeding from the Vapour raised from

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*some by saying it is a common venereal disease, & is a great deal of these from the*

the corruption of the Spermatick Blood, which corruption is occasion'd by a mixture of divers Seeds. This Principle being supposed, we do reject this feigned malignant Quality, for it cannot be said what it is, or from whence this malignity arises, but we acknowledge this Vapour, and admit the Corruption of the Seed, and we say (not mentioning, the malign Quality) that there are certain Atoms excited by Heat and Motion, which do exhale and free themselves from the loose and corrupt Blood, and finding the Pores of mans Body, and of the *natural parts* to be open and dilated, do creep and insinuate themselves into them, and in process of time, do penetrate into the Spermatick Vessels, from thence into the great Veins, and from thence into the great Vessels and the Liver, being the Trunk of them, which they by dividing do alter, and by separating do Corrupt, whence, at length there follows a corruption of all the Blood.

The subtilty and continual motion of these emancipated Atoms, appears from the Gout, sometimes from the Reliques of the Venereal Distemper; for these Atoms do penetrate into the marrow of the Bones, and fix them above the Articulations,

The corruption of the Spermatick Blood, is occasion'd by a mixture of divers Seeds. This Principle being supposed, we do reject this feigned malignant Quality, for it cannot be said what it is, or from whence this malignity arises, but we acknowledge this Vapour, and admit the Corruption of the Seed, and we say (not mentioning, the malign Quality) that there are certain Atoms excited by Heat and Motion, which do exhale and free themselves from the loose and corrupt Blood, and finding the Pores of mans Body, and of the natural parts to be open and dilated, do creep and insinuate themselves into them, and in process of time, do penetrate into the Spermatick Vessels, from thence into the great Veins, and from thence into the great Vessels and the Liver, being the Trunk of them, which they by dividing do alter, and by separating do Corrupt, whence, at length there follows a corruption of all the Blood.

ticulations, where they find an allume-  
 nous matter, to which they stick: But  
 because these Venereal and other emanci-  
 pated Atoms are not fixed, therefore  
 they are moved in those places where  
 they are, like a Captive fetter'd in Pri-  
 son, looking about him, which way he  
 can most conveniently make his escape;  
 hence it is, that the pain of the Gout  
 doth not cease until these Atoms are dis-  
 charged, either by Transpiration, Sweat,  
 or some other Evacuation, or that they  
 are wholly accumulated by other Bodies,  
 of the same figure; or that they are al-  
 together stopped in their motion by a  
 condensation of those alluminous matters,  
 whence the Gout becomes knotty and in-  
 curable.

### C H A P. XIII.

*Of Sublimate, Arsenick, and other sorts  
 of Poisons, and the deadly Effects  
 which proceed from them.*

**T**Here are two sorts of Sublimate,  
 the one corrosive, the other sweet.  
 The first is a most violent Poison: The o-  
 ther is a most excellent Remedy for  
 Worms in Children; however, it is not  
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without some malignity, and therefore, it is given but in very small Doses; and as to the first, fortified by the Corrosive Spirits of Salt and Vitriol, the least quantity of it cannot be administred, without inconveniency, nay Death it self. In this place we are to enquire, wherein doth that Poison, which is so powerful consist; for as soon as Sublimate is swallowed down, it produces Ulcers, Blisters, and excoriation in the Tunicles, or Coats of the Ventricle, they are seized with an inflammation, over-run with a Gangreen; and unless a good Antidote be taken, (as I shall shew hereafter) death it self is the consequence of it; but let us see by what malignity that Sublimate produces these deadly Effects, and wherein the force of this Poison doth consist.

That we may be able to comprehend this Truth, and discover wherein the malignity of this Poison doth consist; it is to be supposed, That Sublimate is an artificial Poison, being a Compound of the most subtile Particles of Quick-silver, Salt and Vitriol, sublimated together, in the form of Crystal or white Powder, like Sugar: So that the Venomous and Corrosive Sublimate, is made neither of Quick-silver, Salt, or Vitriol alone, and apart, but there ought to be the Spirit of Salt  
and

and Vitriol to separate the Quick-silver, and that though before it was fluid like water, is to be reduced into dry Earth; which is done by reason that these two Spirits do separate the Mercury in the sublimation, and in some manner kill it, and do penetrate it, as if they were Poison to the Quick-silver it self, they corrupt it, and force it to change its disposition, because they divide it, and reduce its Corpuscles into small stings, whence it is that they are so sharp, penetrating, and Corrosive: Which doth not happen, if the Quick-silver be sublimated by it self; for then it ascends in its own fluid and gliding Nature, and in this manner it may be taken inward without any danger, and also when the Sublimate is sublimated with Crude Quick-silver.

This being supposed, I conclude, That Sublimate is a Poison which suddenly operates in our Body, to the destruction of it, because its Corpuscles are reduced into Stings, like the Corpuscles of Fire, Salt, and Vitriol, which does sharpen the Corpuscles of the Quick-silver, wherefore they produce the same effects in the Body, as Fire or the Caustick Stone swallowed do, for it presently burns every thing that it touches, and Ulcerates the whole Stomach, Gullet, and all the Parts

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through

through which it passes; because its Corpuscles being so sharpened, do penetrate and dart thro', like flames of Fire; therefore Antipathy hath nothing to do in this place, no more hath that feigned Maligne and Occult Quality, as the less learned would fain alledge: All that is observed concerning this Subject, ought to be ascribed to the Disposition, subtilty, and figure of the Corpuscles, which renders them Corrosive and burning.

The same thing may be said of Arsenick, except only that Arsenick, is the work of Nature, and Sublimate that of Art; for in truth, Arsenick is a perfect Mineral which is found in the Earth, and Sublimate, is prepared by Artists in sublimatory Vessels.

The Effects of Arsenick, as well the White as the Red, is near the same with those of the Sublimate, and both of them by right may be ranked amongst the most prompt and violent Poisons, in respect of the sharp and penetrating Particles, whereof they do consist. There is nothing which disappoint these Effects, except proper Antidotes made use of in time, which change this disposition, and blunt the sharpness of those Corrosive Corpuscles.

Nevertheless, by special preparations, those Venomous Corpuscles may be taken

ken away, both from the Sublimate, and the Arsenick : And by our fortifying and changeing of the Compound, a most excellent Remedy, for the health of Man, may be made of the most pernicious Poison, as the Triacle is made of Vipers Flesh, which is the best Antidote, as we shall see in the following Chapter.

## C H A P. XIV.

### *Of Antidotes.*

**A**R T, together with Nature, supplies us with as many sorts of Antidotes, as there are Poisons : The Viper, no less than the Scorpion, carries its Antidote ; if the Serpent begins to creep out of the Earth, Nature affords us the Leaves of Ash (which buds at the same time) to heal its bite ; the same ground which bears a *Thora*, hath also near an *Anthora*, which is its Antidote.

There are also external Antidotes, which do avert the Plague, and preserve the Body from the Contagion, as we said before, speaking of Amulets, where we did declare how this may be done, and how the Body may be preserved from

every Malignant Air, without any fictitious Sympathy or Antipathy.

Antidotes are general, and special, or specifick; they are general which resist every Poison; they are particular, which are appropriated only to certain Poisons. That it may be rightly explained how Antidotes do work upon Poison, and how they hinder its operation, we must suppose, that all Poisons and Toxicks, are reducible to two kinds; the first doth consist of emancipated Atoms, which are properly Poisons; under the second, are comprehended Toxicks, as Sublimate, and the like; and that consists in sharp penetrating, cutting Particles, such as the Particles of Fire, which Burn, Ulcerate, and Tear the inward parts of the Person who takes them: These things being supposed, it will be no hard matter to explain the Nature of Antidotes.

Having made this difference between Poisons and Toxicks, it is certain, that there are Antidotes against Poisons, and that they are diverse, according to the diversity of the Toxicks: Hence we see that Triacles, of all the Antidotes which we have, is most proper, and most specifick against the Poison of Vipers, because Triacle is made of Vipers flesh, and the emancipated Atoms proceeding from it,



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Dr. - care Mr. Henshaw Dr. B. -  
County of W. and C. D. -

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The Poison of a Mad Dog is very hard to be cured; and as that sort of Madness is accounted incurable, and is publickly attended with a very deadly and fatal issue, we are forced to bind those who are infected or suspected, and at length to smother them between two Feather-beds.

The ordinary Remedy is to send them to the Sea, to throw them into it several times: Experience teaches us that that kind of Remedy is not altogether useless, but is to be accounted amongst those which are most safe, though it be not altogether infallible. The antipathy of the Sea-water hath no room here, and it were vain to alledge it in the confirmation of this practice: Therefore I say, that, according to our Principles, the emancipated Atoms proceeding from the spittle of the mad dog, while they penetrate the substance of the Brain, or at least begin to penetrate it, or to be turned round its foldings, to enter into its Cavities, are interrupted in their motion, so that they cannot enter into the Cavities of it, nay and they are thrown partly out by those struglings which the Patient must necessarily suffer when he is cast into the Sea: I do not, nor will not deny, but that

*there*  
*is a kind of relief as to the*  
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*always 1/2 81* —

there are Atoms or Corpuscles proceeding from the Froth of the Sea, which entring into the Patients body thro' the Pores, made open by the agitation, or by breathing in of the Air, and being communicated to the blood, do with their cubicular figures, fix and withstand the emancipated Atoms which produce the madness or nearly dispose the body to it: To comprehend in a word all that can be said concerning this matter, whatsoever can heal or give ease to a Distemper so dangerous, it does it only by hindring the Motion of those loosed Atoms, or by quite expelling them out of the body.

The same thing may be said of the third sort of Poison, that is, the *Venerial*, which is called the *French* disease, That also hath its general and specifick Antidotes: Quick-silver is commonly used for this business, and that by reason of that antipathy which is betwixt it and the disease, it is most certainly held to be the one only Remedy for it: Others use Sudorificks, as *Guajacum*, *Salsaparilla*, or animal or Mineral *Bezoar*, or the salt of *Vipers*: Others are only contented with one Remedy, which is *Mercury* perfected by Nature, and radically divided by Art; also the more industrious do use Philosophical water,

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prepa-

*The good effects arising from various operations of the body is increased the*  
*remedy being used according to the case & affords of the degree of death in some cases*

( 82 )

prepared from the Beams of the Sun and Moon.

But tho' we may provide an excellent Remedy against this Distemper; nevertheless it must be confessed, that it is not radically taken away, but by the help of those things which expel the *Venerial* emancipated Atoms, from the Centre to the Circumference, whether it be done by sweat, or by an insensible transpiration; this doth not happen by Antipathy, or some occult quality, but by the motion of the Particles of the Medicine, which strike against these miserable Atoms, and drive them out by those most convenient ways, that is, the Pores of our Body.

Therefore let us proceed to those Antidotes which are opposite to Toxicks, not by Antipathy, or some occult quality, but by their different figures. Therefore who will say that Milk hath an aversion to Sublimate or Arsenick, though it be a most speedy Remedy, and that no less than Oyl which doth resist Poyson, because descending into the Ventricle, and in its passage touching the Gullet and the orifice of the Ventricle, as well as Milk doth lessen the motion of the Corpuscles of the  
*in the former page you say here* Poison,

Poison, and blunts the sharp points and corners of them, and defends all those Parts. But of all things a Vomit is most useful in this Case, being assisted with the help of Milk, or Oyle Slackning the Tunicles of the Stomach, and making the Passage more easie: For if a Vomit should be given without smoothing and besmearing the Passage, the Venome in coming out would Excoriate all the parts that it touched, by its sharp-pointed, Saw-like, and Hooked Particles; which are covered by the Particles of Oyl or Milk going out with them, and are so prohibited and hindred from hurting.

In the Conclusion of this Chapter I do observe, that Corrupt Humours in our Body (as Physicians do affirm to us) do degenerate into Poisons and Toxicks, but they are silent as to the Reason of this Confusion, and all the manner of avoiding it. First, they ascribe this Corruption to External Causes, or to inward Occult and Maligne Qualities, or to the excess of certain Qualities, (as Cold, Hot, Dry, Moist) or to certain unwholesom Diet, and to ill Digestion, or lastly, to Obstructions, hindring the necessary distribution of them: But truly it is not demonstrated from thence, that crude and

*an ambiguity between Qualities and  
the Venome is cured*

an undigested Diet, or Corrupt Humours, do degenerate into Poison, therefore the true Cause of this thing, and the solid Reason of it, must be enquired into.

To this purpose, I do suppose, that the Humours or Nourishment being any manner of way divided, may be said to be Corrupted, because I acknowledge no difference between a division and a corruption of a thing; but in a separation which is not total, there remain some Bodies which are neither Poisons, nor Toxicks, though they Oppress and Obstruct the Parts, and hinder the intercourse of the Spirits, as it happens in Phlegm, Melancholly, and Slimy Humours, which are joyned with the Earthy part of the Excrements. Besides these Bodies, there are other Corpuscles which with their Hooks, Sharp points, and Stings, do pierce, prick, and penetrate Man's Body, and the Membranes of it, as also the Veins, Muscles, and Nerves, and do Corrode the Stomach; and in the same manner with Poison, do occasion Ulcers, Imposthumes, and Pustles. These are those which the Physicians do call sharp, biting and Chollerick Humours; whereof (that I may end this Tract concerning Sympathy and Antipathy, and the Actions depending thereon, and without these Occult Causes assign a  
true

true and an Efficient Cause of all our Distempers ) I am compelled to treat in a Chapter by it self, and in that which follows shall be delivered the General means whereby the Causes and Roots of all Diseases may be Removed.

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## C H A P. XV.

### *The True Cause of our Diseases.*

**T**HE Effects of our Diseases are pernicious, and have their Origine either from within or without ; the Causes of them sometimes are so obscure, that the Original of them cannot be discovered ; and though we define a Disease to be a disposition against Nature, or an inordinate Constitution of those Qualities which are Constituent of a Right Temperature, yet for all this, we are not Wiser or more Learned than we were before : Therefore after I have Discoursed Physically of the Causes of our Diseases in General, it will not be amiss to trace out the Particular Causes of them.

That this Doctrine which may be accounted new, may the better be understood, I suppose, that we are never subject to any Disease, but whose immediate Cause

Cause is either some Poison or Toxick. 2<sup>ly</sup>. This Poison consists only in emancipated Atoms, and Toxicks in loosned Corpuscles. 3<sup>ly</sup>. These Atoms are not emancipated; nor these sharp Corpuscles loosned, but in the Corruption of Bodies. 4<sup>ly</sup>. Corruption is nothing but a Total or Partial Division and separation of Bodies. 5<sup>ly</sup>. There is no new Generation by which a new Body is made, but by a precedent corruption or Division of another Body, which ceases to be in Nature, when one or more other Bodies possess the Room of it. So when Meat in the Stomach is turned into Chyle, when the Chyle in the Liver, and the Branches of the *Vena Porta* is changed into Blood, and lastly, when the Blood is changed into our Substance, as Flesh, Muscles, Nerves, and other Parts of our Body, by the last degree of Concoction, there is necessarily a Corruption of the Meat, which begins to be divided and separated by Chewing of it in the Mouth, and it is digested and separated, or Corrupted in the Ventricle: Chyle, to the end it may be turned into Blood, is altered in the Branches of the *Vena Porta*, and the Meseraick Veins; and thence it is wholly and perfectly Digested, that is, Corrupted, Concocted, and Divided in the Liver, unless



less that hath lost something of its own Substance. The Blood designed for Flesh, is filtred out of the Veins into the Arteries, and Circulates until it be sufficiently purged, and freed from Foreign Bodies, and then it is changed into the Substance of our Body. *In the*

This Doctrine being supposed, I say there are made in us Three Principle Corruptions, which are the Concoctions or Digestions whereof we speak: and I say moreover, that there are Atoms in every one of them, which are emancipated and loosed, as likewise Corpuscles, flying and deserting more or less, as the Digestion is the better performed, that is, as the Pure is more rightly separated from the Impure.

Therefore it follows, that we cannot be nourished, unless we take together into our Bodies the Causes and Seeds of many Diseases; It follows likewise, that these Diseases are diverse, according to the difference of the Corruptions of the emancipated Atoms, or the loosed Corpuscles, and that these Atoms are Poisons, and the Corpuscles Toxicks, which do produce Diseases by their violent Motion, and they labour so with Reiterated Corruptions, that they deprave, separate, and divide all the Parts of our Body. Here

Here we may behold the just Cause of the Pains of the Stomach, and of the Wind Chollick, and also of the Wind proceeding from the first Concoction of our Meat in the Stomach, these winds are the Corpuscles or the more subtile Parts of that Corrupted Nourishment; and when the more subtile and sharp Corpuscles are received into the Body, they do, proportionably to the Nourishment which is taken, produce most troublesome and dangerous Pains, and velli-cations, such as we observe in the Chollick. And if it should happen, that amongst Corpuscles there should be abundance of emancipated Atoms, they do ordinarily betake themselves to the Brain, whence do arise Apoplexies, and Lethargies; or if they penetrate into the Muscles and Nerves, they occasion the Palsie, which ordinarily follows these bilious Chollicks.

This Indisposition degenerates the Disease into a *Vomiting*, and *Loosness*, when the Wind or the subtile Particles, the loosed Corpuscles, and the emancipated Atoms are so plentiful, that all the Symmetry of the Humours, the intercourse of the Natural Spirits, and the whole Anatomy of the Body are overthrown by them; whence it is conspicuous, what great Confusions, Winds, Vapours, and little Bodies,

Bodies, and depraved Atoms are capable of producing in our Bodies: And that I have concluded upon good Reasons, That there is Poison to be found in all our Diseases; whether we consider them in their Beginning, when we perceive our selves grieved, indisposed, and to have lost our Appetite; or that we take a view of them in their progress, when those Winds, those little Bodies or little Atoms are advanced in the Body, and do work a Division; or lastly, if we consider the end, when these Poisons and Toxicks, and these Corpuscles being freed from their Chains, and these emancipated Atoms bear the sway, by the confusion of the Principal Operations, they are the Cause of Death.

In the second Digestion, which is in the Liver, we find Winds and Vapours, which are called *Flatus's*; and sometimes those loose Corpuscles, and also the emancipated Atoms; these Winds do produce a murmur and *Flatus* about the Liver, Spleen, Hypochondria, and the Reins; and the Corpuscles which are lodged there, do prick and exulcerate the inward Parts, and are the Causes of Imposthumes, which are so hard to be Cured.

Besides the emancipated Atoms Flying,

ing, do sometimes ascend up to the Head, where they beget Vertigo's and Buzzing in the Ears; and also Convulsions by their vellications in the principal of the Nerves; Thence proceed Epilepsie, and other Diseases, which have the same malignity; which in the Opinion of all Men, being not a Quality, is a Poison, that is, the Atoms of the Blood are emancipated, which are a Poison to the Brain, and especially to the Membranes and Nerves.

From the same Fountain proceed Shakings, and the duplications of continuant Fevers, as the Periodick Fits of intermittent Fevers do happen from loosed Corpuscles and Atoms which are emancipated in the first Digestion in the Stomach, by reason of a Fermentation which they make. These loosed Bodies are also the Causes of Swellings in the Feet, Hands, and other Parts; as Inflammations, Erysipela's, as also Itch and sore Puscles do arise from Atoms which are emancipated in the last Digestion; as for the Dropsie we may say that it derives its Original from Atoms which are emancipated in the first and second Concoction, for they penetrate the substance of the Liver, and render it unfit to produce a well constituted Blood.

Sudden

\* Sudden death is often occasioned by the sudden motion of the flying Atoms, which escape in the circulation of the Blood; and the emancipated Atoms opening the heart, and by this passage giving an opportunity to the vital Spirits to make their escape, is the cause of that present death which follows it.

## C H A P. XVI.

### *Of the Causes of our Health.*

**I**F that be true, which I suppose, That all our Diseases do not arise from Natural Qualities, nor from Antipathy, which is in the nourishment we take; and that they are nothing else but a confusion, and an inordinate constitution of the Spirits, humours and parts, and that this confusion doth proceed from the impetuous and disorderly motion of the Winds, Corpuscles and emancipated Atoms, as I said before: Then it is certain that our health, which consists only in the just intercourse of the Spirits, and a proportionate mixture of the humours, doth not proceed but from things constituting and preserving this just temperament, and

The Vital spirits may be lost in a moment of time

and by the same it is conserved.

As there are many things which destroy Health, so there are also a great number of those things which restore and confirm it. The things which destroy it, are those which rarifie the humours, and occasion winds which dissolve bodies, and do emancipate Atoms: Those which restore it, are such things, or such remedies, which hinder the division, rarefaction, and dissolution of the Humours and Parts of our body, or since it happens that necessarily there is a corruption in every digestion, and a division of the aliment, chyle, and the blood, as we observed before from the same Principle, it necessarily follows, that every thing that preserves Health, hinders the alteration of it, and also restores it, being lost, which drives out of the body these Winds, these Corpufcles, or these injurious Atoms: And that also which removes these Seeds, or internal Principles of our Diseases out of our Bodies, doth not produce that Effect by a certain Vertue, or Physical quality, or by a certain Antipathy, as it is said of *Rubarb* and *Senna*, but by motion and action which is made upon these rarified bodies, these loosed Corpufcles,

or

or emancipated Atoms, proceeding from every digestion in the bodies of those which are most healthful.

This Motion is performed either by Purgatives or Emeticks, or by Sudorifics, the two former of these are fitted to eject those which arise from the first and second digestion, and Sudorifics do expel Corpuscles or Atoms of the third digestion, but here is no room to shew the differences of these Remedies; however we must trace out the manner of those Operations.

I said a while that Medicaments do operate only by a vellication of Membranes, Nerves, and Fibres, and which is produced by sharp Corpuscles flowing from the Medicines, and sticking to the aforementioned parts, whose motion is communicated to the subtle Foreign bodies, that is, the Excrements of every particular digestion, whereby these matters are driven forth the nearest and most commodious way for evacuation. I'll make an end of this Chapter, with an Example of a familiar Remedy, by Means whereof every man may preserve his Health, without either bleeding or Purging; nevertheless, I do allow that bleeding sometimes is necessary, and very useful to evacuate those emancipated

emancipated Atoms or Corpufcles, which are loofed in the veins, from the digestion in the Liver, efpecially when they being ſhut up, and cannot find their way out, they ſtick to the Pleura Membrane, and prick and vellicate it, and thereon produce an inflammation, known by the name of *Pleurifie*, Therefore in this Diſtemper, as alſo in continual Fevers, Bleeding and Sudorificks are by no means to be omitted.

The ſame thing may be ſaid of uſing Purgative Remedies or *Emeticks*, to evacuate earthy Excrements, as flegme and ſlimy humours ariſing from the firſt digestion; and alſo Serofities or Choller, and Melancholly being the Excrements of the ſecond Concoction, but becauſe the defects of the firſt Concoction are not mended or repaired in the ſecond; and the firſt is more perfect, as the Ventricle is more pure and more clean, and cleared of that viſcous Flegm which diſturbs its action, and hinders digestion. Without either envy or prejudice, I do here produce a vulgar Remedy as moſt uſeful to preſerve or reſtore Health, if it be rightly uſed as it ſhould be, as I have found it by experience, beſides that it manifeſts the Truth of my Principles,



ciples, which supposes every evacuation to be made by motion and vellication of the sharp Corpuscles or penetrating Atoms.

Therefore I take every morning a Goose Feather ; fit and slender, as it is in its own Nature, I put this gently into my mouth, and I thrust it further to my jaws, and hold it there for some time, and I draw backwards and forwards, and I perceive a vellication made by the Feather on my Jaw, Palate, and the other Parts adjoining ; and likewise after this vellication, I do observe that Water, Phlegm, and viscous humours, being dissolved, do flow in great quantity for the space of a quarter of an hour ; And all this is done without any violence or danger, hereby I find that the Head is lightsome, and the Stomach freed and disburthened, and that thereby the Appetite is increased, and that the Corpuscles which before ascended to the Brain by way of Vapours are evacuated, incarcerated, or involved in the viscous humours which are flowing, and afterward the first digestion is better made ; and it is evidenced by experience, that as the ventricle is less burdned, so our Sleep is longer, sweeter, and less interrupted :  
Were

Were it not that I fear to exceed those bounds which I proposed to my self, I could make many useful Observations upon this Subject. But I must remember that I do not speak of Medicine, Remedies, Health, and Diseases, but by chance and occasionally, and it is sufficient, if I oblige the Publick and the Learned with the Doctrine of Atoms, and that I be helpful to Them as well as to the Sick, by the means of those Remedies which I discover, and which I freely propose: And though I offer many things which were neither said, taught, nor writ before; nevertheless I beg the Readers pardon, for that I add no more to this matter, for I am afraid if I should, to be tedious to him, and if I have enlarged my self too far, I hope he will forgive me; it were hard to say less of these things, except a man would say nothing at all of them, besides that it is grateful to every man to speak and write of those things which he loves, and are agreeable with his Profession.

CHAP.

## C H A P. XVII.

*Of Formal, Exemplary, and Material Causes.*

**F**orm and *Formal Cause* is one and the same thing; and when we say there are two sorts of Forms, that is only according to our manner of conceiving things. So we say there are two sorts of Formal Causes, the Substantial and Accidental.

But all these Forms are imaginary, neither do true Philosophers acknowledge any other Substance to be in Natural Compounds, than Matter, except only in man; nor any other Form than the disposition of the Parts, because all these Forms are altogether useless.

Moreover these great Sticklers for Forms, cannot say what they would mean by a Substantial or Accidental Form, Therefore we do with a great deal of Justice lay aside these fictitious Forms, as being but Chimeras, and of no use.

The *Exemplary Cause* may be referred to the formal, because it is the Idea and inward form of that which we frame in our Spirit; so the formal Cause of a Picture, is the disposition of its parts,

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according

according to the disposition and ordination which it then had in the Spirit of the Painter. The same may be said of all rational Agents, which are endued with understanding.

There is no difference betwixt Matter and a *Material Cause*, and there are two sorts of material Causes, as well as of matter; That is the First matter, out of which all bodies are composed, and into which, by an Universal Division, they may be reduced; the Second, is nothing else but Bodies made of the first, and upon which the efficient Causes do exercise their activities.

Therefore it is apparent, That there is nothing in the World, but what is a Compound, and that there is no Compound without matter. It is also certain, That there is nothing made without an Efficient Cause, which acts upon Compounds and destroys them, that of them others may be made; because the matter of the first, serves for the composition of the second; the Matter which goes to the composition of the first and second, is the first Matter, or Material Cause of the Compound, and that Matter which serves the Efficient Cause for a Subject and Patient, is called the Second Matter.

Both of them may be an efficient cause,  
for

for Compounds do act upon one another, as the Elements which drive one another backwards and forwards; that which drives another is called the Agent, as that which is driven is called the Patient; and if there be any thing which resists it, and drives back another, this regrefs of the motion is called a reaction; so one and the same thing, may be the Subject and cause of Motion; and that to give and receive, being the Principle of Agent and Patient, may Be at the same time, but in divers respects.

## C H A P. XVIII.

### *Of the first Matter.*

**A**LL Philosophers do unanimously agree, That there is a *first Matter* in the World, which was produced from the beginning, and tho' it can never be altered by any Change, yet it is to be seen in all the Generations and Corruptions which are in Nature; this doth suppose, that the first Matter did exist before the Generation of the Compound wherein it is found, and that it still remains, and survives the Corruption.

tion of it; as fire is made of Chips, the Matter of the Fire was in the Chips, and it is found partly in the Fire, partly in the Smoak, and partly also in the Ashes. It is agreed by all Men, That nothing is made out of nothing, and that there is nothing in Nature, which can be reduced into nothing, so that the first remains one, and the same in all the Revolutions which do happen. Therefore in respect of Matter, we may justly say, that there is nothing new in the World, since the Creation of it, and that this Matter, in its Nature, is incorruptible, so that to explain the Essence of this first Matter, is all, and the one only difficulty: If we hearken to *Aristotle*, he makes It the Subject of all Forms, and that It is nothing but a passive Power, or a meer Capacity of producing, and receiving them in its Bosom; He says in another place, that Matter in it self hath neither quality nor quantity, nor any Essence, beside that which it received from that Form which perfected it: But this explanation gives us no Idea of Matter, neither doth it teach us any thing of the nature of it; on the other hand, according to this Doctrine, we may say that Matter is something, and we may say at the same time, that it is nothing; and that

*Without the actual spirit it  
matter the proper wood have no form or  
coherence or force*

it gives that Being to Form, and receives the same from it; and lastly, that it hath distinct parts without any quantity; which seems to be impossible.

They were more in the right, who said, That the first Matter was nothing else but the first Elements, into which Compounds by a total dissolution are reduced, also these Elements ought to be simple, and indivisible, for otherwise, the first Elements are not such as we suppose them to be: It follows, from this Doctrine, that neither Water, nor Air, nor Earth, nor Fire, are the first Elements of things, because they are Compounds: Therefore we must look out for other Elements, which are simple and indivisible; those things which the *Chymists* would fain establish, that is, *X* Salt, Sulphur, and Mercury, cannot be taken for the First Elements of Bodies, since they are but Compounds of many other Bodies. I am of the same Opinion concerning *Descartes* his three Elements, which he would have to be the principles of things, which is impossible, because they are divisible.

Therefore we must acknowledge, that only simple and indivisible Atoms, are the first Matter, and first Principles and Elements whereof Bodies are composed; Out of

*X This may be the source of 3<sup>d</sup> denied from the Premises*

It shall not be *circles* <sup>102</sup> The mind of a  
mathematician may comprehend or make

these Atoms are Corpuscles made, out of the  
Corpuscles small Masses, out of Masses greater  
parts, & then of these parts greater Bodies,  
whereof the Universe doth consist;  
In the same manner, going backward in an  
analytical method, the World is divided into  
great Bodies, those into parts, parts into  
small Masses, Masses into Corpuscles, and last-  
ly, these Corpuscles are divided into Atoms.

*because of the great number of divisions*  
C H A P. XIX.  
*this process is to the infinites*

Of Atoms and their Nature.

**T**HAT we may solidly evince the ex-  
istency of Atoms, we must sup-  
pose, that every compound may be divi-  
ded into so many parts, as there are  
which make the compound, Therefore di-  
vision ought necessarily to cease, when  
there is a failure of parts to be divided;  
on the other side, there is no end of it,  
as long as there are Particles to be divi-  
ded; one of the two we must allow;  
that is, either that a body cannot be so  
exactly divided, but that there always  
remain divisible parts in infinitum; or,  
that there are parts after a certain num-  
ber of Divisions, which will not admit  
any further division; Aristotle stands for  
the former, but Gassendus and the Anci-  
ents *When this compound is so divided we*  
*do not arrive at your favorite atom -*

*we find in a manner of speaking that the process of division is infinite - that*  
*we find in a manner of speaking that the process of division is infinite - that*  
*we find in a manner of speaking that the process of division is infinite - that*



ent Philosophers do defend the latter  
and according to this last Doctrine, af-  
ter all the Divisions are made, nothing  
can remain besides Atoms, that is, indi-  
visible Beings, which are the first Ele-  
ments of Natural Bodies.

I confess, it is hard to imagin a corporeal-thing to be indivisible, because we see nothing in this World, which is not divisible, but this makes nothing against Atoms, which are Corporeal, because they compose Bodies, and are Indivisible, because they are the first, and most simple Elements of Bodies: Hence arises another difficulty, because it cannot be easily explained; after what manner a thing that is divisible, is composed of parts which are indivisible. C

Impartial minds do not find so much difficulty in conceiving this matter, as those do, who follow the prejudices which they have received : First, these Men who are thus so prepossessed, do not consider, that there are many things which escape our Senses, and yet are most real. Secondly, they do not consider that that which composes a Body, is not a compound, as we see that Unity makes number, tho' it self be not a number : Letters, whereof Nouns and words are framed, yet are neither the one nor the other. The drops

1 a sample of indivisible & divisible being of.  
1 this by reducing the compound to its ultimate

of Water whereof Rivers do consist, are not Rivers; so Atoms though they are invisible and indivisible, yet they compose Bodies which are visible and divisible.

*Aristotle* and his Followers, do teach us, That a small body, as for Example, a Millet Seed, is divisible in *infinitum*, and that it contains an infinite number of Parts; which being supposed, it may be concluded, that there are as many parts in the Millet Seed, as there are in the whole Terrestrial Globe: Also according to this Opinion, we must grant, that a Body cannot be divided into as many parts, as really it may, and that neither the hither or further end of a staff can be found, nor that there is a Circle or perfect Pyramid, nor that the parts of a Body can be immediately divided. All which consequences as they are absolutely necessary, so they are all equally absurd.

*Descartes* did endeavour to free himself from this difficulty, by saying that the number of the parts of the Millet-Seed, was neither finite, nor infinite; but only that they were indefinite: But the evasion is ridiculous, and these two Philosophers are forced to confess, that every part of the Millet-seed hath its extension,

ension, and if their Number be either infinite or indefinite, then their extensions also will be either infinite or indefinite at the least, which is absurd to affirm. I add no more, to avoid Scholastic Intricacies and distinctions.

## C H A P. XX.

*The Properties, Magnitude, Figure, Weight and Motion of Atoms.*

**A**N Atom is a corporeal Being, simple, invisible, and indivisible: Solidity constitutes its Essence, or essential property, which distinguishes it from Spirits and Vacuity, which have no power of resisting.

Atoms do necessarily avoid all our Senses, because these are composed of many distinct and gross parts, whose Object ought to be composed, e're it can be perceived by the external Organ, which nevertheless doth not destroy the truth and reality of Atoms, because small Corpuscles do escape our Senses, as we observe in Dust which sticks to our Cloaths, and also in the Corpuscles of a Ring, which is wasted and diminished by time and use, in the Corpuscles of a Stone, which is made hollow

*Vide 102. after 100. by*

o This is double *operation*. It may be &  
by the continual pressure of the Drops.

- o by the drops of Water which fall upon it in divers occult parts, in a Mite which cannot be seen without the help of a Microscope, and lastly, in small Corpuscles, which are seen to move in a Chamber, by the help of the Sun-beams; that we may omit many others which are smaller, which without doubt we could see, if our sight was sharper, as I shall mention in my Animadversions about Experiments of *Microscopes*.

Though Atoms are most subtle and imperceptible, yet they have their particular extension, magnitude, and figure, from whence their differences do arise; for the figure of some of them is round, as the Atoms of Water, Oyl, and Quick-Silver; others have cubicular figures, such are the Atoms of Sea-Water; and others are Pyramidal, as those whereof Nitre doth consist; there are some which have sharp points like needles as Fire, whence we are to suppose that there are others variously figured.

This difference is necessary to distinguish Compounds: And as these Atoms, as to their solidity, or invisibility, and indivisibility (which are their inseparable Properties) are alike; so also if they did not differ in their figure and thickness, all bodies would be of the same likeness.

How can that be altered? Weight.

these are circumstances  
which are necessary

Weight is the Principle of the said Natural Motion, inasmuch as it doth resist a violent motion: That I mention here, that we may know whether motion of Atoms hath an internal or an external Principle, or whether Weight be determined only to one Motion, or that it be indifferently inclined to many: And whether the motion of Atoms do tend to some Center: And whether it be continuant or interrupted: And lastly, whether it be perpendicular or horizontal, Parallel or declined, right or parabolical, or circular.

In order to resolve well this difficulty, I suppose that Atoms may be considered in a double State, The First State of them is before the Composition of the bodies which are made of them, which may be called the State of Liberty: The other is that which they have in the bodies which do consist of them; which may be termed the State of obligation or servitude.

If Atoms be considered in their First State, their motion is perpetual: So that an Atom that is loose and freed from any composition, is essentially in motion, which ought not in the least to be wondered at; for Motion in respect of a free Atom, is the same that Understanding

standing is in respect of an Angel, which is never without knowing, unless his Intellect is bound and clouded.

From this Principle it is evident, That Atoms are in continual motion, unless they are hindered, or that there is some obstruction in the way, or that there are other Atoms resisting and repelling of them, or that they find such as will stick unto them, or that they insinuate themselves into the Atoms of certain bodies, or that they enter into some composition, whereby their motion is stopped.

Nevertheless, Atoms in Compounds are not altogether void of motion, because they are not so straitly imbodyed together, but that they have some motion, like *Vibrations* and *Palpitations*, according to the liberty which is granted them by the disseminated Vacuities; nay, some of them sometimes do attempt their escape, especially in porous bodies, which therefore are sooner corrupted and perish, than other Bodies which are more solid, and more close. It is yet more evident in living bodies, out of which the animal Spirits, which are but the bodies of Atoms, and most subtile Corpuscles, are dissipated by transpiration, whence aliments are necessarily requisite, for to supply the Spirits of the whole body,

*The body of that fine which animals it in the*  
*Solar corpuscles it is for nourishment and fuel —*

which are dissipated by motion and agitation.

This motion of Atoms, or the least Corpuscles, in living bodies, may be deservedly accounted the Image of their first liberty, and tho' they do but seldom enjoy their full liberty, yet they are apt to raise the greatest commotions, in order to be freed, and to gain their liberty; this is the origine of many distempers, as in Acute Fevers, the Atoms or Corpuscles of the boiling blood, or obstructed choller, are carried and driven into the Brain, where they produce watchfulness, Deliriums, and Phrensies.

According to this Principle, that which we said before may be concluded, *That many Distempers do arise from minute Corpuscles, and emancipated Atoms.* For These being driven forwards by other Atoms, and forced back, do run into the membranes, *Periostiam, Meninges,* or intestines, and cause Pains, which they call the Collick, Headach, Gouts and Rheumatisms; So that this solution of Corpuscles, and emancipation of Atoms in our Bodies, are much to be feared, and to prevent this danger, all motions of the body which are too violent, must be avoided; for these are the external cause of the confusion of the Spirits, and

and the emancipation of the Atoms.

The emancipation of Atoms, and also of the small Corpuscles, which are composed of those Atoms, are to be feared no less in the great than little World, for the Winds are nothing else but emancipated Atoms, which by their impetuosity, being driven backwards and forwards, do force all bodies which they meet with in their way: It is these Atoms which agitate the Air and the Sea, and cause Earth-quakes, and also overturn all things which resist their motion: Therefore, the motions of Atoms, are neither equal nor every where alike, but they do vary according to the diversity of Bodies whereby they are driven, or as the figures of them are more or less fitted for motion, or otherwise, according to the proportion of Vacuities, which are dispersed in bodies; So that some Atoms are moved quicker, and others slower, not because some are heavier than others, but because they are driven backwards and forwards, or are stopped by others which do fix them, with the greater or less violence.

CHAP.



## C H A P. XXI.

*Difficulties arising from the Doctrine of Atoms.*

THE first which presents it self, is in relation to the Being and Nature of Atoms, therefore it is hard to conceive, that an Atom is corporeal and material, and at the same time, that it is indivisible, or that the same being indivisible, should at the same time have its grossness and extension; but this difficulty proceeds from nothing else, but the prejudice of our Senses, which can conceive no Objects, but as they are divisible and gross, neither can they give to our Soul, (which is an indivisible being) an Idea of an indivisible thing.

It is only our Soul which is indivisible, as well as an Atom, is able to conceive the nature of them, which being elevated above the Senses, can correct the Errors of them; therefore I say that an Atom is not a body, according to the Notion which we have of it; that it is a compound Being; but I affirm it to be a simple Being, and also Corporeal; that is to say, simple, because it is indivisible; and corporeal, because it hath a certain



*in sublime, in us, in things, more*  
*Ambrosius* (143)  
 so that an Atom is divisible. To this  
 difficulty, I answer with the Divines,  
 That Angels and our Souls, which are Spi-  
 rits; and also with Philosophers, that  
 physical Points which are material, have  
 no *real*, but only *potential* parts; that is,  
 an Angel and the rational Soul, in respect  
 of the operations which they exercise,  
 and the space which they occupy; and  
 the tumid points, in respect of the space  
 which they fill up: Indeed an Angel and  
 the Soul have two powers, whereof the  
 one is the Intellect, the other the Will,  
 which being no more but an indivisible  
 substance, which are capable of under-  
 standing, and willing; yet no Man will  
 deny but that they, notwithstanding  
 their indivisibility (which at least, is equal  
 to the indivisibility of an Atom) do fill  
 up a divisible space; as no Man can  
 doubt, but that an Angel can be at the  
 same time in the four corners of the  
 Room, and likewise can be in the middle  
 of it, and that it hath a four square figure,  
 by communication with the four Angles  
 or Corners, and that it can quit this,  
 and assume another figure at its pleasure,  
 which cannot be said of tumid points,  
 and Atoms; which are destitute of Under-  
 standing and Will: The rational Soul  
 being equally indivisible with an Atom,  
 let it be at hand in the rational Angel,

*spiritus*  
*of liquid*  
*is so far material & like compass of matter*  
*but its boundary only is a mean whereby it is*  
*the space of figure, of form*  
*the space of figure, of form*

*Ainapso, consequently (this doctrine must be  
(wisdom)  
enriched* 114

Angel, or point, doth wholly possess a great body, no less than it did then when the body was little; therefore it does dilate it self without being divided, because in its nature it is simple and  
X indivisible, and is without distinct parts.

This is the Opinion of *Aristotle*, and indeed it is the most common Opinion. But if the Soul were not by its own substance extended through the whole body, and had its seat only in the Heart, as *Empedocles* would have it, or in the Spleen  
X (and the Stomach, as *Van Helmont* places  
*supra*) it, or in the *Glandula Pinealis* of the Brain, according to *Cartesius*, or in the *Striate* bodies of the Brain, where the common sense is, or the sense it self, as it is called by way of excellency, and in the Callous parts, because there it forms the Ideas of things, and judges of them, and in the cineritious part of the Brain, because there it performs the functions of the memory, according to the Opinion of *Duncane*; It is certain, that all these parts which are taken to be the seat of the Soul, are divisible, and that they have distinct parts and figures; so the Soul, as it is indivisible, occupies a space or place which is divisible, whence I conclude, that the indivisibility does not hinder, but that a substance may have a cer-

Y *hologram* also for how can an immaterial  
substance or spirit grow like G.O.D. -

behind all hands of these men & that we be aware  
of the interlock (resembling 115) their eyes on

tain indivisible extension, but divisible as to the place which it possesses, or that it may have Angles and figures, in respect of place, though its substance essentially remain one, simple, and indivisible; *Delugo* and his followers, do apply this Doctrine to tumid points; and truly, I conceive I may take the same liberty to apply it to Atoms; from this Principle, which is, that an Angel, or the rational Soul, are neither more simple, nor more indivisible than a material Atom, as we have supposed it, and laid it down as a Principle.

To these I add, that it is not sufficient that any thing be divisible because it hath Parts, but they ought to be Physically distinct and joined together by a Physical Union, nor that each of these Parts should be of the same Essence with the whole Compound whereof they are parts. But it is certain that the Parts of an Atom are not Physically distinct; for the one could neither be, nor cease to be without the other, no more than the two Essential Perfections of Man, that is to be an Animal and Rational Creature: And briefly the Parts of an Atom are the Parts of a Simple Being, which are in Unity, but not in Union: and by Consequence really inseparable; which is no hindrance,

hindrance, but that the Mind of a Man may be able to conceive some kind of interval, and some diversity betwixt the Parts of an Atom, in the same manner as the Animal and Rational Natures are represented in a Man, as if they were two Physically distinct things.

*Gassendus* Reasons from another Principle which is very solid, and built upon the solidity of Atoms, but upon the insolidity of a Vacuum; he takes an Atom to be indivisible because it is solid; but that that Solidity and Bodies likewise are not Divisible, unless by reason of the void spaces which are found in them, and which do desert the Interval; by which the Body may be divided 'till we come to those Bodies, which, having no Vacuum within them, can be divided by no Natural Cause, because a Vacuum having neither solidity, nor any power of resisting, is the Passive Principle of every Physical Division. By a Vacuum I understand the intermediate space betwixt the Parts: And as that which has not a passive Principle of Motion is immoveable, so also that which hath not a Passive Principle of Division, is indivisible; And that we may wholly silence all the *Cartesians*, I do affirm an Atom to be indivisible, because there is

no

no interval in it, by which means some Agent may divide it, in the same manner, that they deny that God is able to remove the Universe, because they say there is no other place wherein it can be posited; which I would willingly grant them, if there was no place without the World. It is necessary that they should agree with *Gassendus*, if there be no interval in an Atom.

The Question is, If three Atoms be placed together in Order, whether the middle one doth touch the other two which are on both sides of it? This being supposed, it must have two sides, and two several Faces. I also ask, whether an Angel being immediately placed betwixt two Angels, together with a third, in a straight Line of three Foot long, whether one of them be touched by one on this side, and by the other on the other side? And since there is the same difficulty, it requires also the same Answer.

But I answer directly, and say, That all these, for Example, square sides of an Atom and their Faces are not Parts Physically distinct, but only simple Beings, and Physically Indivisible, as the Philosophers do Teach, that there is in Man a principle of Sense, and a Principle

ciple of Reason; though these two are but a simple Being, and indivisible like an Atom, and the sole difference doth consist in the respect of their divers Effects, and of our Spirit, which finds an interval where really indeed there was none.

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## CHAP. XXII.

*Of the Disseminate, Congregate, and Separate Vacuum of Gassendus.*

**T**He Doctrine of a Vacuum is contrary both to the Doctrines of *Aristotle*, and *Cartesius*; the First was of Opinion, that it was impossible that Naturally there should be a Vacuum, because, saith he, the Universal Nature is against it. The other Ridicules this Fear of Nature, though notwithstanding he teaches that there can be no such thing as a Vacuum in Nature.

*Gassendus* on the other side affirms three sorts of Vacuums, the First of which he calleth a *Dispersed Vacuum*, which he saith must necessarily be in all Bodies, and this Doctrine he endeavours to prove by Motion, which cannot be done but in a Vacuum: For that truly

no



no Body can be moved in a space that is taken up by another Body, because there is no penetration of Bodies, and therefore cannot be moved but in a void space.

The *Cartesians* do endeavour to elude this difficulty, by saying that there is a yielding, subtile, and fluid matter, which is not able to resist the Motion of a solid Body forcing the same. But that this is but a flight evasion, a poor shift, appears from hence, that this matter is incapable of yielding, unless it were filled with small empty Pores which are dispersed thorow, which being condensed and pressing themselves together, do suffer it to yield, and when it is condensed so far that there is no Vacuum, it yields no farther, but it resists Natural Agents, though of great force. So we see air, condensed and compressed in an Iron Tube doth resist a Staff which we endeavour to thrust into it, therefore air, which is a matter apt to yield, ceases to be so, when there are no more Vacuums dispersed in it, neither can Bodies enter into it, without a peneration of the Dimensions: whence it appears, that *there is no such thing as a yielding Matter*, and that every Matter in its Nature is equally solid and resisting.

To

To this Demonstration I add further, That not so much as a Gnat cou'd in the least move it self, unless there was a Vacuum in the Air, (which is a matter of it self apt to yield,) but that at the same time the Region of the Air, nay and the Heaven it self must be in motion; because if all things be full of bodies, the Gnat cannot be moved but by driving the ambient Air, which Air also drives the next, and that again the next, and so in a right line to Heaven it self; and if the World according to *Cartesius's* Doctrine had no bounds, this motion wou'd have an infinite continuance, which wou'd be a thing both absurd and ridiculous in the highest degree.

This Philosopher did believe that he was able to elude this Reason, by supposing this motion not to be in a right-line but Circular; but besides that the Air is not moved but in that manner that it is driven, and that indeed it is forced in a right line, but not circularly, as it is supposed it ought to be moved, it is most certain that this circular motion, by altogether supposing all Privation of a Vacuum in this Element, is impossible: For if there be no Vacuum, all things are Full: If Full, the first part of this supposed Circle cannot be moved, because

X *As like the Water this motion would be it  
and seen by throwing a Stone into it as in my way.*

it finds no place through which it can be moved: Therefore it ought to remain immoveable with all other things, which are in the Universe, unless there were a Vacuum, through which it might commence its motion.

*Gassendus* builds the Truth of these small dispersed Vacuums upon the truth of the figures of Atoms and their angles, because Angles cannot but leave void spaces in Bodies, as we see a great many Grains of Corn do leave void spaces in the Bushel wherein they are contained, and do touch one the other. I confess that these Vacuums are replenished with Air, but Vacuums which for the same reason are amongst the smallest parts of the Air or Atoms, can be replenished with no matter; and if they be replenished with it, I do demand whether the parts of this subtile matter have figures? which if they have, they cannot be united and joyned together without a Vacuum, which if they have not, neither have they Extension, nor are they material according to the very Principle of the *Cartesians*.

To all that has been said, we may joyn an Experiment about the rarefaction and condensation of bodies, and the confirmation of disseminate Vacuums,

undisputable

**G**

for

special force makes the body need for the. Control over preparing between  
whenever state returns, emergency surveillance - 2 vision in flying

for Example, take a Glass-Phial with a long neck, which being well heated, put it into a Vessel full of Water, so that the end of the neck of the Vial may go a little way into it, we shall certainly see that the water presently ascends to a certain height, as the Air in the Vial is condensed, and gives way.

From this Experiment I conclude two things in defence of a Vacuum. Whereof the first is, That the air is before rarified in the Vial, and that the parts of it are more dilated: (But this rarefaction of the air cannot be done but by the help of the great and more copious Vacuums:) The other is, That the Water could not ascend in the Vial, unless the air did give way, and was condensed: But air cannot be condensed, unless the parts of it close nearer together, and that they could not do without a Vacuum; therefore we must conclude, that air is condensed by the help of Vacuums, which are partly taken away, and lessened as well in Quality as in Number; as it happens in a Bushel full of Corn or Salt when it is moved, by which motion it is not a little condensed; and the Atoms of Fire beget a dilating Motion to the air in the Glass, but Cold produces a condensing Motion, and as it is condensed

denſed and becomes more groſs, the airy Atoms do alſo draw the Water as it were with ſmall hooks, or the external air lying upon the Water makes it aſcend by Reaſon of the Vacuum which gives place, or at leaſt does not reſiſt the weight of the Air.

But perhaps they will ſay that there is no Vacuum in the air, but that many Particles of ſubtile matter do go out from the Vial, and give place to the aſcending Water. But this answer gives no manner of ſatisfaction, becauſe there is no body to force this ſubtile Matter, neither is there any way through which it may paſs, as alſo there is no Cauſe aſſigned why the Water is forced upwards. As to this, we muſt have re- courſe to the ſmall empty ſpaces which are found in all Bodies, which Bodies are more or leſs fluid or ſolid, as they have more or leſs of Matter or Renitency, as there is the greater or leſſer number of thoſe Vacuums, whereof we ſpeak, diſperſed through them.

## C H A P. XXIII.

*Of a Congregate Vacuum, against Aristotle and Cartesius.*

**G**ASSENDUS is not only against these two Philosophers concerning a Dispersed Vacuum, but also about a Congregate one which is very remarkable, and is to be found about divers Compound Bodies. *Aristotle* who fights for Quality, or Accidents distinct from Substance, rejects a Vacuum as a thing which Nature can no ways endure. But *Cartesius* speaks yet more hardly of it, for he affirms that the Production of it in the World, does not only exceed the power of Second Causes, but even of the First Cause it self.

*Aristotle* endeavours to prove his Doctrine after this manner, to wit, That in his Opinion a Vacuum would interrupt and hinder the Motion and Action of Natural Causes: For if indeed Light and Heat be Accidents, the Sun could not produce either of them in a Vacuum, or through it, though there was never so little of it in the Air, equal to the least imaginable point; for according to this Opinion, they are Accidents, and  
have

have need of a Subject, which a Vacuum does not afford them. *Descartes* Builds upon another Foundation, for he acknowledges no difference between Extension, and Matter extended; and therefore he affirms that there is no distance between two Walls, betwixt which there is no air nor Matter, but that they would fall close together: Which how ridiculous it is, we shall see by what follows.

I affirm therefore, That Nature doth not abhor a Vacuum, nor that it is impossible that there should be a Vacuum in Nature; for indeed there is no ground for this imaginary fear, and the Experiment which I bring, will most solidly demonstrate the Existence of a Vacuum.

This Experiment was made at *Clermont* by the late *Mr. Paschall*, a Man well esteemed by all that knew him, he took a Glass Tube four Foot long, divided into Inches and Lines, open at one end only, through which being filled with Quick-Silver, and then put into an Earthen Vessel full of Water and Quick-Silver, immediately the Quick-Silver that was in the Tube did descend, and stuck at the height of Twenty five Inches, and Five Lines and a half, and

*if the result in what this is about - if the result in what the meters feel of - & contrary -*

*if I have 2 water be built in the air and others - this is about - if the result in what the meters feel of - & contrary -*

*if I have 2 water be built in the air and others - this is about - if the result in what the meters feel of - & contrary -*

*Make the tube appear fuller till it can  
be little full (124) the m a g e m*

remained visibly in that State for the  
space of Five Hours.

This Experiment was afterwards made  
in several places, two or three times, I,  
and several persons of Quality and Lear-  
ning being present, and indeed every  
time it did more or less sink down, accor-  
ding to the highness or lowness of the  
place where the Experiment was made,  
without any visible alteration in one and  
the same place; I conclude, that the space  
which remains above the Quick-silver, is  
a Vacuum, and that nothing but Light  
is contained within it, we must therefore  
say either that Light is not an accident but  
a body, which fills the space, or else that  
this space is a Vacuum, and that Light  
is in it without its subject.

It may be said that the Glass being  
porous, the Air or some other Body more  
subtile, might enter into the Tube, and  
replenish the space left by the descending  
Quick-silver; but that cannot be, because  
the Quick-silver descends on a sudden,  
and the Air could not so suddenly enter  
in without breaking of the Glass: But if  
it did enter, why does not the Quick-sil-  
ver descend to the very bottom, but re-  
main suspended at a Certain height?

From this Experiment it appears, That  
a Vacuum, according to the conception  
which



which Aristotle hath left us of it, is not impossible to be in Nature. Secondly, that the external Air by its weight presses upon the Water and Quick-silver in the Earthen Vessel, for otherwise all the Quick-silver contained in the Tube, would fall down to the very bottom. Thirdly, that the same Air hath a greater pressure in Vallies than in Mountains, especially upon those that are very high, because here it is more subtile and rare, and more dilated by disseminated Vacuums, whereby its weight is lessened, together with its strength and resistency.

It must be admitted  
that they must be admitted  
as they must be admitted  
as they must be admitted

The Opinion of Cartesius is yet more ridiculous, who affirms, That a Vacuum is impossible even in respect of the Divine Power; which Opinion is no less impious than it is rash, for no Man can deny, but that God is able to reduce into nothing, the Air that is contained in the Vial, and also to hinder any other body from coming into its place. Descartes says, that this Hypothesis is impossible, and that if this Air was annihilated, the sides of the Viol would immediately touch one another, because says he, things betwixt which nothing interposes, do touch one another; That is true, that when nothing was there, nothing could be there, or when things

come  
X & this Doctrine left it must not be  
as but he is unqualified to say that no

*This is not a philosophical argument* (126)

come together to be joined; But we suppose here, that the parts of the Vial remain in their first State, as indeed they do, if they are not any ways moved, which they do not, God Almighty hindring; and whosoever denys that God Almighty is able to hinder this Motion, and this Contiguity; in so supposing is ridiculous and rash, prescribing Limits to God Almighty's Power.

There is moreover a separate Vacuum, that is, a space beyond the World, which some do call an Imaginary space, in which God hath not indeed produced, but nevertheless can produce something. Of this we will speak in the Second Part, which we now Begin.

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## The Second Part of *Physick*.

*In which is Treated of Cœlestial Things  
which happen above Man.*

THE World in General is a Theatre of the Wonderful things of God, and a Collection of all things which he hath produced, whereof the World is the Lowest, and least Noble; but the Heaven the most High, and the most Noble; We do now here propose to speak

*Of it here we consider can have more  
a vacuum. I should have said here*

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What is it that has, can or may place that in a real  
position matter or your future the about him? What possibly do we have  
along — — — — — distance — — — — —

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*Aristotle* and his Followers affirm, That the World is bounded by the Exterior and Convex part of the Heavens; and beyond that, there are void and imaginary Spaces, in which there is nothing Real. *Gassendus* and his Disciples are of the same Opinion, concerning the Limits and Circumference of the World; but he denieth that there are imaginary Spaces without the Heavens, and he says indeed, that they are Vacuums, and yet nevertheless that they are real; and this is it which he calls a Separate Vacuum. - *unquies. extra mater et natura*

x of the most expensive of the 1840

— This passage by any supposition  
between the center part of the circle  
c & what is the ( 128 ) Difference —

intollerable; because the World is limited  
in its being, as well as in its duration, that  
is to say, by a fluid space, or by time; It is  
therefore limited in respect of place,  
which is a permanent space which it pos-  
sesses, even to the Circumference, (that  
is to the Convex Part of the Heaven)  
otherwise the World would be Infinite,  
and absolutely immensurable in its exten-  
sion; and indeed if the World had not  
Limits, in respect of time, or that the  
instant wherein it begun could not be  
found out, it would be Eternal. In like  
manner, if we acknowledge no end of  
the World's extension, we may say it is  
immensurable: But if the whole World  
be immense and indefinite, as *Descartes*  
would have it, if it hath neither Figure  
nor Extream Parts, it must evidently  
follow, that it is Infinite, for that which  
in all its parts is real, or hath any part  
which we cannot count its last, is abso-  
lutely and actually Infinite in its exten-  
sion: But if *Descartes* will play with the  
word Indefinite, and say indeed, that the  
World is Indefinite, because it hath no  
end in its extension; but yet from  
thence it does not follow that it is Infi-  
nite. I would ask him to tell me the diffe-  
rence betwixt an Infinite Line, and an  
Indefinite one, and also between the im-  
mensity

of the note. The passage by any supposition  
between the center part of the circle  
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rence betwixt an Infinite Line, and an  
Indefinite one, and also between the im-  
mensity

is (small but how can he distinguish  
as what we think (129) mathematic

infinity of God, and the Indefiniteness  
of the World? for if the World is Inde-  
finite, the same thing may be said of it,  
that *Trismegistus* said of God, to wit,  
that it hath neither Centre nor Circum-  
ference; whence it follows, that this  
World Occupies all Spaces, and that it  
is immoveable, nor can it be moved out  
of its place, and that God cannot Cre-  
ate another World without Destroying  
this, because there is no Room in which  
God Almighty might place it. All  
which Consequences are inevitable, and  
the Principle of it more than rash.

The Opinion contrary to the for-  
mer, which is *Gassendus's*, and which we  
embrace, is more firm and agreeable to  
Reason; for it teaches That this World  
is limited in respect of Place, and that  
it hath both a Circumference as well as  
a Centre; Beyond which there are void  
Spaces, in which God Almighty could  
produce another, or more Worlds, grea-  
ter, or equal to this of ours wherein  
we dwell, if he pleased.

From this most true Opinion it is  
concluded, That God fills by his Immen-  
sity all infinite Spaces, and that he is really  
in them, and that He is no ways limi-  
ted by the Circumference of the Hea-  
vens, and that He can there produce a-

There must contain our enemies nother  
what do they ask on.

what is that which is the circumference of the world - if this is like figure of a sphere  
is that not to be apprehended by the senses - if this is like figure of a sphere

X another World, remote from this of ours; and according to this Hypothesis, this distance or that interval will have its dimensions, although void and immaterial, yet mensurable.

From thence it is concluded, That since space is (as indeed it is) immutable and immoveable, it is the proper place of Bodies, actually, or potentially, as they do or do not exist; for if a Body be in it, the space is filled, otherwise there is a Vacuum, as we suppose, beyond the Heavens where there are no Bodies, so that I say that the place and extension of Bodies is a permanent space, in like manner as time the measure of the duration of things is a fluid space.

## C H A P. II.

### *Of the Heavens, and their Nature.*

ALL that can be said of the Heavens and their Nature, relates to their Substance, Figure, Number, and Motion.

The Substance of them is the same with that of the Inferiour World; for there are not two sorts of matter essentially distinct, and all Material Bodies

X If the plurality of words is not a  
 like fashion and much in of  
 words

are equally solid and impenetrable; in that the essence of matter consists: And although there be some kind of difference between Terrestrial and Cœlestial Matter, it cannot yet notwithstanding be thence concluded that they are of a several Nature; because all the diversity proceeds from this, that the Atoms of the Cœlestial Matter are more subtile than the Atoms of the Terrestrial Matter, and more exact, more moveable, and more perfect in respect of their Figures, and the more perfect Bodies compounded of them, and their Mass better united, and lastly, the whole Body more compleat.

This Doctrine may be illustrated by the Example of Letters, for those which Compose a Word, and which are accurately delineated and written, do not differ from those which Compose the same Word, and are ill-delineated and written; the first nevertheless are better, more exact, and more elegantly formed; which happens, in respect of the same Hand which makes them, according to the difference of the Pen or Ink, or the Design of the Writer, who makes longer, or rounder, or after any fashion he pleases. I say therefore, that the Heavens which declare the Glory of  
God

God, differ as much from the Earth, as a Printed Book from a Manuscript. Atoms like Letters are the same in both, which although they are of the same Author, do not agree in their Figure and shape, because Almighty God would have it so, in order to the Fairness and Beauty of the World.

The Figure of the Heavens appears round to us : This Figure is most perfect, and therefore accounted most fit for Motion, and nothing perswades us to affirm the contrary ; but on the other hand, all things perswades us that the Figure of the Heavens is round, since it encompasses the Earth which is round. And since we observe the Stars to have their Nocturnal Risings and Settings, which could never happen, if the Heavens were not Round.

The Number of the Heavens cannot easily be found out ; there are some who say there are Eleven, others reckon Nine, but the greatest part conclude that there are only Three ; that is to say, the Heaven of the Planets, which they say is wholly Fluid, in which they swim like Fishes in the Water ; the next that follows according to this Opinion, is the Firmament, altogether Solid, where all the Fix'd Stars are placed like



so many Golden Nails, or Diamonds set in Blue; but the third is the Imperial Heaven, the Seat of the Happy, partly Solid, and partly Fluid: because the blessed Bodies ought to dwell in a place where they may move, and freely breath the Air of Paradise. This Opinion seems the rather to be embraced by me, because it is most consonant to the Holy Scripture; wherein we read that the Apostle *Paul* was rapt up into the third Heaven; whereupon, from thence he testifies that he was lifted up into Paradise.

Lastly, the motion of the Heavens is uncertain: For it is a received Opinion, that the Heaven of the Planets, or at least the Planets themselves are moved about the Earth, as also the Firmament with the Fix'd Stars. But others teach us, that the Firmament as well as the Sun is immoveable, and the Planets together with the Earth, as being a Seventh Planet, are wheeled about the Sun. This we examine in the following Chapter.

## C H A P. III.

*Of the Stars, and their Substance.*

**A**S Mettals and Stones are the Ornaments of the Terrestrial World, so are Stars of the Cœlestial; some of which are called Fixed Stars, keeping always the same place; other wandring Stars or Planets, always changing place, and in their Reciprocal Conjunctions and Oppositions coming nearer, or going further of; the first are fixed to the Firmament or Starry Heaven, the others to the Heaven of the Planets.

The Substance of the Fixed Stars and Planets is of the same Matter with the Heavens, and the Earth, for there are not two first Matters, but there are many differences to be found amongst the Compounds of the first. Between these Compounds there are Degrees of Nobility; even as we see upon Earth, that Gold is more Noble, more perfect, and more precious than Silver, Silver than other Mettaline Bodies; Rubies, and Diamonds than other Precious Stones. In the same manner it is in the Heavens, where the Sun which is the most perfect of the Planets, and each Star hath its particular splendour, which doth not happen  
from

from the diversity of matter, but from its depuration, which consequentially arises from its distance from terrestrial and opaque Bodies. How many different Pictures can one and the same Painter make out of the same Colours, only by a different disposition of them? how many different sorts of Books can there be made out of the same Syllables and Words by Transposing of them? what then hinders, but that we may grant the Author of Nature power to make out of so many Atoms diversly disposed, so many Bodies differing in Elegancy and Clarity, as are the Stars or Planets? The matter therefore is the same of the Heaven and the Earth, of the Dirt under our Feet, and the Stars above us. Whereupon a certain Ancient and Eminent Philosopher said, that *the things above are like the things below*: and so on the contrary. And we know very well that Gold, as Precious and Beautiful as it is, is of the same Matter with Lead, and there is nothing requisite to the making of Gold, besides the depuration of the Atoms which are its first Matter.

I do here endeavour to deliver an Idea of the Substance of the Stars, upon an Experiment grounded upon melted Metals,

tals, and yet flowing in the Crucible; for Gold falling into *Aqua-fortis* is like a black Powder, Silver dissolved with the same *Aqua-fortis*, and precipitated by Sea Water, or separated by the means of Copper-Plates, is reduced into a Calx, or White, or Greyish Earth: Tin calcined, becomes yellow like Oker; likewise Lead Calcined, becomes yellow, white, black, and red, as we will; Copper is turned into Verdigrease, or into a yellow and red Powder, and in like manner Iron into a red powder called *Crocus Martis*, where by the way it appears how Compound Bodies become different, and vary, without the change of their first matter, by an only separation and division of their Parts, Corpuscles, or Atoms.

Yet if you take these Mettals so Calcined, each by it self, and put them into a Crucible in a Melting Furnace, with a strong Fire, this Powder will return into Mettal again, and shine and sparkle in the Fire; you see then that the same matter is in a threefold different state, for being a solid Body, it is afterwards reduced to a Powder, and then again it is turned into a fluid matter, melting and sparkling in the Fire.

And this is the thing from whence I frame the Idea, which I promised, concerning

ning the Fixed Stars and the Planets; for nothing better represents the Nature of the Sun and its Substance, than Melted Gold flowing in a great Crucible, nor nothing better represents the Fixed Stars, than the same Gold melted in lesser Crucibles; there is nothing more like the Moon, than Silver melting in a Crucible. The same thing may be said of Lead, in respect of *Saturn*, and of Tin in respect of *Jupiter*, and of Copper in respect of the bright and sparkling *Venus*: So also Iron melted with the Matter which Fluxes it, leaves an Idea of the Planet *Mars*, yet without this Mineral, which Fluxes, it better shews its refulgent redness. So it may be truly said, that the Sun is like melted Gold, and the Moon like melted Silver; and so of *Saturn*, and the rest.

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CHAP.

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## C H A P. IV.

*Of the Magnitude of the Stars, and  
their Figures.*

SINCE the Substance of the Stars is like melted Mettal, it may be likewise concluded, that the same is likewise round, because a melted Mettal is always round, unless it be hindred by the Mould in which it is cast, or by the Crucible in which it is melting, and since there is nothing that compels Stars to assume another Figure, than that which is Natural to them, and which is the most perfect of all Figures, which is most agreeable to the first matter, out of which they are made by the Author of Nature; we ought to grant that they are round. As to their Magnitude, Astronomers represent them to be immeasurable, and they take their Hypothesis from the Rules of the Opticks, and from the experience of those great Optick Tubes; the Invention of which is attributed to *Campanella*, but the Restoration and improvement of them to *Anthony de Reita*, as appears by his Book Entituled *Oculus Enoch & Elia*. The Sun is commonly taken to be an hundred and

sixty

sixty and six times greater than the Earth, and the Earth to be three times as big as the Moon, and the other Stars are some bigger, and some lesser; I would not dwell long upon a matter so far above us, especially when I consider the weakness of all those things which Astronomers tell us concerning them, and the dissention which is amongst the most Learned about them.

*Epicurus* is quite of another Opinion, for he says that the true Magnitude of the Sun and Stars is not much greater than they appear to us; because, says this Philosopher, since we see them to have Natural Colours, it follows then, that we see them in their just Magnitude; and he adds, that we never see Objects in their true Magnitude, but when we discern their Colour, Figure, and Circumference: He endeavours to prove this his Opinion by the Example of Fire, which we behold truly as it is; greater, or lesser, accordingly as it Flames: and after this rate, fixed Stars would not be much greater than they appear: The same thing may be said of the Planets also, because they are less remote from us than the Fixed Stars.

I should not much dislike this Opinion,  
if

if it were not rejected by the whole World, and that the Shades, Paralaxes, and Eclipses evince the contrary. Therefore we embrace the most received Opinion, and positively affirm, That the most experienced, with the help of all their Optick Tubes, are not able to delineate the true and just Magnitude of the Planets, much less of the Fixed Stars, whose shadow is small, and they a great way distant from the Earth.

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## C H A P. V.

### *Of the Motion of the Stars.*

**A**RISTOTLE endeavouring to avoid or shun all the difficulties which occur in great plenty, concerning the Motion of the Heavens, thought he was easily able to explain it, together with its swiftness and regularity by the help of an Intelligent Mover, sent by God as an Adjutant Form, to move, push on, direct, and order the Heaven, and each Planet in all their Motion.

This Doctrine seems to be at once both very easie, and very clear; for  
if



if Heaven and the Planets have really a kind of motion, (of which there is no doubt,) there is nothing more easie than to have recourse to an Angel, who, by Gods Command, is the mover and director of it. But we should sooner agree upon the Point, by having recourse to God, the Author of Nature, and saying, that He as the first Author hath impressed this motion upon the Heaven, and the Stars, from the beginning of the World, and that he doth continually conserve it as the First Cause, by his general concurrence, without using the Ministry of Angels to perform it, which would be no more necessary, than to assign a helping Angel to the motion of Animals, and the Vegetation of Plants, which no Man will go about to do, unless he designs to make himself ridiculous.

¶ This Opinion supposes the Earth to be in the Center of the World, immoveable, and that the Heavens are wheeled about this Center upon the two Poles of the World: The Assertors of this Opinion do affirm, That the Imperial Heaven is fixt, and immoveable, of a round or square Figure, and that the Firmament observes the motion of the *Primum Mobile*; and by the impression

pression of it, is rapidly moved from East to West, together with the Fixed Stars which it violently carries along with it.

As to the Planetary Heaven, they who affirm it to be Fluid, do also teach us that the Planets do likewise in this vast space move with the like liberty that Fish do in the Water, or Birds in the Air, excepting only that the motion of the Stars is regular, and that of Fish and Birds is not. They who make to be as many Heavens as there are Planets, or that every Planet hath its Orb, are forced to confess, that either their Heaven is fluid, or if it be solid, that there are passages and ways through which they are carried; and to explain these appearances, they are under a necessity of feigning certain Circles which they call Epicycles, or Excentrix; from whence arises unexplicable confusions; whilst others say that these Circles are only imaginary.

But they who affirm the Sun to be immoveable in the center of the World, who conclude that the Earth is in its place a Seventh Planet, and hath a Motion round it as well as the rest, and that the Firmament and the Fixed Stars (which are annexed to it, and implanted in it, and seen with their Orbs to wheel round over  
our

our heads) to be like the Sun, equally immoveable; are forced to explain the motion of the Planets, and find no little difficulty in explicating their appearances; we will enquire into those which are chiefly built upon truth; by examining first those two most Famous Systems of the World, I mean that of *Ptolomy* and *Copernicus*.

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## C H A P. VI.

### *Ptolomy's System of the World Examined.*

**P***TOLOMY* and *Aristotle* with their Followers, affirm the Earth to be in the Centre of the World immoveable, encompassed round with Air, which they think is next environed with Fire; and so in order there are Orbs of the *Moon*, *Mercury*, *Venus*, the *Sun*, *Mars*, *Jupiter*, *Saturn*, and of the Fixed Stars encompassing one the other, called the Firmament: then the Ninth Heaven, which they call the Chrystaline; and lastly, the *Primum Mobile*, which by its incredible rapidity carries all the other Heavens with it, from East to West.

This Opinion seems to me to be absurd,

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and is a ~~very~~ <sup>very</sup> ~~large~~ <sup>large</sup> ~~circle~~ <sup>circle</sup> ~~if~~ <sup>if</sup> ~~triangular~~ <sup>triangular</sup> ~~and~~ <sup>and</sup> ~~of~~ <sup>of</sup> ~~square~~ <sup>square</sup> ~~in~~ <sup>in</sup> ~~the~~ <sup>the</sup> ~~Heavens~~ <sup>Heavens</sup>, because it supposes the Heavens, and especially the *Primum Mobile*, to be of an immense Magnitude; so that the Earth would be but a point in respect of Heaven. Yet *Ptolomy* will have these immense Bodies, and vast Machines to be moved round this point of Earth, which seems little consonant to reason, which dictates to us, that little Bodies are much more readily moved round greater, than great Bodies round less; and we commonly say when we are roasting Meat, that the Meat must turn round to the Fire, and not the Fire turn round it. It is therefore more commodious, and more consonant to Reason, that the Earth which is only like a point, or a Gnat, should be moved round the Heavens, than the Heavens should turn round about it. Most wisely therefore hath the Creator of the Universe disposed things in such a manner, that the Reasons of them are conspicuous every where; that we may say that God does not only produce Works which are good in their substance; but also that he hath done good unto all that he hath made; that is, exactly in Number, Weight, and Measure.

Besides this General Reason which destroys and over-turns the Opinion of

Why may not the Earth be the *Ptolomy* nucleus, or center of the universe

Call it the *Primum Mobile* <sup>the</sup> <sup>center</sup> <sup>of</sup> <sup>the</sup> <sup>universe</sup> <sup>as</sup> <sup>the</sup> <sup>Earth</sup> <sup>is</sup> <sup>the</sup> <sup>center</sup> <sup>of</sup> <sup>the</sup> <sup>universe</sup> <sup>in</sup> <sup>the</sup> <sup>opinion</sup> <sup>of</sup> <sup>the</sup> <sup>ancients</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>poets</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>philosophers</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>theologians</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>common</sup> <sup>sense</sup> <sup>of</sup> <sup>the</sup> <sup>people</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>divine</sup> <sup>inspiration</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>revelation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>scriptures</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>prophets</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>apostles</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>evangelists</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>church</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>world</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>age</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>time</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>place</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>circumstances</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>events</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>consequences</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>causes</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>effects</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>means</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>ends</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>principles</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>maxims</sup> <sup>and</sup> <sup>of</sup> 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<sup>of</sup> <sup>the</sup> <sup>desires</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>aversions</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>inclinations</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>repugnances</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>attractions</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>repulsions</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>conjunctions</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>disjunctions</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>union</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>separation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>conservation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>destruction</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>generation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>corruption</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>increase</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>decrease</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>abundance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>scarcity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>riches</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>poverty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>honor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>dishonor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>glory</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>shame</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>joy</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sorrow</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>peace</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>war</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>health</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sickness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>life</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>death</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>eternity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temporality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>infinity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>finiteness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>unity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>plurality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>simplicity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>complexity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>uniformity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>variety</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>consistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>inconsistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>coherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>incoherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>order</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>disorder</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>regularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>irregularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>moderation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>excess</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>intemperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>modesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>immodesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>humility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>pride</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>meekness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>anger</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>gentleness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>hardness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>softness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>rigidity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>flexibility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>stability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>instability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>firmness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>strength</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>power</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>impotence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>riches</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>poverty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>honor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>dishonor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>glory</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>shame</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>joy</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sorrow</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>peace</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>war</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>health</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sickness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>life</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>death</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>eternity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temporality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>infinity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>finiteness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>unity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>plurality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>simplicity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>complexity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>uniformity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>variety</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>consistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>inconsistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>coherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>incoherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>order</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>disorder</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>regularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>irregularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>moderation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>excess</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>intemperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>modesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>immodesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>humility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>pride</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>meekness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>anger</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>gentleness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>hardness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>softness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>rigidity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>flexibility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>stability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>instability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>firmness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>strength</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>power</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>impotence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>riches</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>poverty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>honor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>dishonor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>glory</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>shame</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>joy</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sorrow</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>peace</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>war</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>health</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sickness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>life</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>death</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>eternity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temporality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>infinity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>finiteness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>unity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>plurality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>simplicity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>complexity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>uniformity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>variety</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>consistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>inconsistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>coherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>incoherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>order</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>disorder</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>regularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>irregularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>moderation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>excess</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>intemperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>modesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>immodesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>humility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>pride</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>meekness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>anger</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>gentleness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>hardness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>softness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>rigidity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>flexibility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>stability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>instability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>firmness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>strength</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>power</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>impotence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>riches</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>poverty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>honor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>dishonor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>glory</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>shame</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>joy</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sorrow</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>peace</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>war</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>health</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sickness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>life</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>death</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>eternity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temporality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>infinity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>finiteness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>unity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>plurality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>simplicity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>complexity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>uniformity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>variety</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>consistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>inconsistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>coherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>incoherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>order</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>disorder</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>regularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>irregularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>moderation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>excess</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>intemperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>modesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>immodesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>humility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>pride</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>meekness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>anger</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>gentleness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>hardness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>softness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>rigidity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>flexibility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>stability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>instability</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>firmness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>strength</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>weakness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>power</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>impotence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>riches</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>poverty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>honor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>dishonor</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>glory</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>shame</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>joy</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sorrow</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>peace</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>war</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>health</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>sickness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>life</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>death</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>eternity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temporality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>infinity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>finiteness</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>unity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>plurality</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>simplicity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>complexity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>uniformity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>variety</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>consistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>inconsistency</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>coherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>incoherence</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>order</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>disorder</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>regularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>irregularity</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>moderation</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>excess</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>temperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>intemperance</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>modesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>immodesty</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>humility</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>pride</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup> <sup>meekness</sup> <sup>and</sup> <sup>of</sup> 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<sup>the</sup> <sup>war</sup> <sup>and</sup> <sup>of</sup> <sup>the</sup>

12. *Water wheel* 145 ) equally produces

*Protony* and *Aristotle*; we may take another from the incredible rapidity of the Heavens motion about the Earth; for if their Opinion be true in this Hypothesis, and according to the reckoning of Astrologers, we must confess that the distance of the *Primum Mobile* from the Earth, is above an hundred thousand Miles; from whence may be computed the greatness of this Heaven, and the manner of its motion, that it should perform and compleat its Circle in the space of twenty four hours; whereas all People agree in this (*viz.*) That the Earth compleats forty Miles in every hour, when in the mean time its Circle is but a point in respect of the *Primum Mobile*. We must conclude therefore, that its swiftness is incomprehensible, and that every one point of its Circumference, compleats each hour more than forty times an hundred thousand Miles, which is incredible. To all these I add another difficulty which I have concerning this Opinion, in explaining the manner, and the little Hooks by which the *Primum Mobile* carries the inferiour Orbs along with it from East to West; and that the Heavens and the Planets go to this Pole, but come back from the other, and

Center of Gravity - the Earth might be kept part of the circumference of the Earth - its center of gravity is kept up by the Earth's gravity

all turn round it <sup>H<sup>2</sup></sup> & yet it turn in its own center - If all matter had been

then at last return to their first point, by the sole Collibration or Ballancing of the Ninth *Heaven* or *Chrystalline* : To which if we add the solidity of the Cœlestial Globes in that manner as *Ptolomy* has affirmed, then neither *Aristotle* nor *Tyco Brache* with his Epicycles, and Excentricities, will be able to take away these difficulties, or avoid horrible confusions ; lastly, these Philosophers could not explicate the regular or irregular motion of Commets, unless by appointing Angels to guide them, which is ridiculous.

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## C H A P. VII.

### Copernicus's *System of the World* *Examined.*

**T**HIS Philosopher, and many other Modern ones have built Systems of the World after another manner; for they place the Sun in the Centre, and will have the Earth and the other Planets to wheel round it, as we have said heretofore.

This System would be sufficiently enough confirmed by refuting of that which *Ptolomy*, *Aristotle*, and their Followers

lowers have framed ; but onely this likewise labours under its peculiar difficulties, The first of which is the experience of our Senses, which seems altogether repugnant to this System, for according to this Opinion, we must conclude the Heavens which seem to move, as also the Sun itself, to be immoveable ; and on the other hand, the Earth to be in continual motion, which seems to be immoveable.

But this prejudice is very uncertain, nor do our senses always so exactly and infallibly distinguish the motion of Bodies, or Bodies that are in motion, as experience teaches : That when any one goes on Ship-board, and the Ship sets Sail, the Shoar and the Houses go away from him : For to this Man the Shoar seems to go away from him, though indeed he goes away from the Shoar. Which happens from hence, that the Eye does not discern the motion of the thing which is moved, when it moves along with it ; which happens to a Man at Sea, who does not at all take notice of the motion of the Ship which is under Sail, because he himself is carried on by the same motion.

To this Opinion also is opposed the experience of a Stone thrown up into

the Air, and there falling down upon the Head, or before the Feet of him that threw it; For if the Earth is really wheeled round and moved, while the Stone is moved, it ought to fall far enough from him who threw it. For we must conclude that the Earth is not turned round, and by consequence that this System of *Copernicus* is false.

To this difficulty *Descartes* answers, That a Stone must so descend, as if the Earth was not in the least moved, because both from the same Vortex; and by the same impression, the Stone as well as the Earth is carried round.

To this very same difficulty *Gassendus* answers after another manner, saying, that the Stone falls before the Feet of him that throws it up, because it receives two motions from the hand of the thrower, (to wit, one Horizontal, and the other Perpendicular) which since it hath received, it ought to keep also, and to describe a Curve, regular, and parabolical Line; and after this manner fall down at the feet of him that threw it, if he (*viz.*) threw it up streight, and the Wind not contrary to it: Just as we see in a great Bullet tumbled down from the top of the Mast, falls streight down to the bottom of it, though



though the Ship Sails with a very violent Wind.

Lastly, it is objected, against the Doctrine of *Copernicus*, That if the Earth be moved about the Sun, it would sometimes be nearer the Firmament and the Pole, and sometimes farther off; and then that for that reason the fixed Stars, especially the Pole Star, must sometimes appear bigger, sometimes lesser, which is contrary to experience. ✕

But they who defend this Opinion, make answer, that the mighty distance which is betwixt the Earth and the fix'd Stars, is the Cause why this difference is not observed. But indeed, in that manner that I shall explain the motion of the Earth, this Objection will appear to be of no moment.

✕ There appears some reason in this when the immense Distance of the Earth from the Sun ( 33 Millions of Leagues ) is considered when it is manifestly evident that in an ascent of 1 or 2 miles from the Summit of Mount *Cenis*, the Sun & Moon appear larger & with far more splendour. but it is this owing to the greater rarity of the air thus & not that they are

## C H A P. VIII.

*Of the Motion of the Earth.*

**C**OPERNICUS attributes to the Earth three motions, the first of which is called Diurnal, by which the Earth is moved about its Axis, as a wheel, from West to East, when as the Sun seems to be moved from East to West. Another motion is from one Pole to the other, according to the latitude of the Zodiack, that is, from one Tropick to another; which motion is called Annual or rather half-yearly, because the Earth in Six Months time runs through the whole Latitude of the Ecliptick, and after other Six Months it returns to the same point from whence it had departed at the beginning of the Year: So it passes through the same Line twice a Year, to wit, at the time of the Æquinoxes. Lastly, the third motion is made round the Sun, whereby according to this Philosopher's Opinion, we are sometimes nearer the fixed Stars, and sometimes farther off.

There are not wanting some who attribute a fourth motion to these three, which we call a Libration from East to West, and so on the contrary. But

*A purpose of lighting & warning the reader of to this contemptible & minute of all comparisons is derogatory from the grandeur of the Copernican system.*

*Earth's motion is of 3 kinds: 1. Rotation about its axis, 2. Translation in the ecliptic, 3. Revolution about the sun. The first is diurnal, the second annual, the third is the motion of the system in the universe.*

X If the Calom were illuminated within the the Sun  
last. But then Design 151. 5 colors or true  
circumference or )

to explain all the Appearances, the  
two first would be sufficient, were we  
not compelled to take in the other two  
likewise. The Diurnal Motion of the  
Earth by which it is turned and whee-  
led round its Axis, and which is per-  
formed from West to East in Twenty  
four hours time, is hard enough to be  
explained, but here's the Comfort, that  
there is no less difficulty found in the  
Opinion of *Aristotle* and *Ptolomy* about  
the explaining the Motion of the Hea-  
vens which ought to be performed in  
the space of four and twenty hours.

Therefore to clear up this difficulty,  
I suppose, if we should be compelled to  
have recourse to an Intelligence, as a  
Mover sent by God for this purpose:  
We have as much reason to assign one  
for the motion of the Earth, as well as  
*Aristotle*, to assign many for the motion  
of the Heavens and the Planets.

By the same right we might have  
run back to the first Cause and its ge-  
neral Concourse, after the example of  
*Cartesius*, who is not ashamed to call  
in This to help him in explaining the  
motion of his *Materia Subtilis*, and the  
Vortex surrounding the Earth; as also  
of all other Natural Motions, which  
God, saith this Philosopher, hath pro-

30 or 40 miles of height  
the circumference of  
the Earth being made for the  
Sun - The diameter of the Sun  
is 860,000 miles  
the distance of the Sun  
from the Earth is 92,000,000 miles  
the diameter of the Earth is 7,920 miles  
the circumference of the Earth is 25,000 miles

Barren partly deserts - hills may be fitted to  
gather the Ottoman (152) or Copernican

duced from the beginning, and always preserves without diminution, but only that this motion does transmigrate from one Body into another, and as much of it as is lessened in one Body, is increased in another: This is the *Cartesian* Opinion. But we are endeavouring to explain this motion of the Earth by more Natural Reasons.

I say therefore, and suppose that the Sun is immoveable in the Centre of the World, and yet notwithstanding, that like a Wheel it turns round about its proper Centre; and this is that motion which is called *Circum-Rotation*; and by this motion it disperses on all sides, on every part these Corpuscles which produce Light and Heat: These Corpuscles compose that great Vortex which is about the Sun, and which with it is carried round, and moves the Earth which is plac'd in the same Vortex with it; like as a Stone is moved by the motion of a rapid Stream, and this same Vortex carries other Planets along with it, accordingly as they are more or less immersed in it.

According to this explication, one may fancy the Sun to be like the wheel of a Clock, which moves that which is next to it another way; for when

But then this motion is completely irregular & one  
not like the Earth's motions, several others are



According to the mind of these Authors, doth not as yet satisfy a Spirit curious to know the truth. So here are other difficulties remaining which must be taken away by more sensible and more Natural Reasons.

First, Though we affirm the Sun to be immoveable, and the Earth to be wheeled round about it; or though we affirm the contrary, there remains nevertheless, that we give an account not only of each of these motions, but also of the motions of the other Planets. It is demanded what is the internal or external Cause of the Earths motion? If it be answered, that the Sun by its Libration is the Cause of it, as we have said, and as our Opinion is; it remains that we demonstrate the Cause, whether internal or external, that gives the Sun this motion: By means of which being librated from one side for Six Months, it is also librated for as many from the other side; and by this so regular motion, it sometimes draws the Earth towards it, and sometimes drives it from it, as we shall see in the following Chapter, what can be said about this Matter.

CHAP.

## C H A P. IX.

*Of the Sun the true Centre, and Heart  
of the World.*

**T**He Sun being placed in the Centre of the World, is like the Heart, inspiring Life into all things, and presiding over all the Works of Nature whatsoever, even as the Heart in an humane Body is the Principle of its Life and all its motions; this is that admirable Machine, which without being moved out of its place, moves the Spirits, Humours, and all the parts, of our Bodies; in like manner, the immoveable Sun by his double motion, shakes and moves the Earth as well as the rest of the Planets. One only difficulty remains in explaining the motion of the Heart in the Microcosme, and of the Sun in the Macrocosme: But being about to treat else-where of the Earths motion, we will here only speak of the Suns motion, which I call a wheeling of it round about the Earth, and afterwards we will speak of its Libration.

Elsewhere, we have said the Sun to be, not only of the same Nature with Gold, but to be Gold indeed, melted

in

*because his greater weight should*  
(156)

*Long known to be many things*  
in the Centre of the World, and Capellated by the Fire of the fix'd Stars, which are every where about it: No wonder therefore that it is wheeled round like melted Gold in a Crusible; and there sparkling, and purified. That this Hypothesis which will bring no little light to many things, may be better comprehended, I will bring an Experiment to confirm this Doctrine, which seems new indeed, but nevertheless it cannot be denied to be built upon the foundation of indubitable Experience.

I say therefore, that if you take Gold and put it into a great Crusible, with Lead, Copper, or other Mettals; and make a Fire every where round it, these Mettals will be melted together, and compose a sparkling smoaking Bath; this Bath or melted Matter is in perpetual motion, and so soon as the matter is made hot, it wheels round its Centre without intermission. It would be much more conspicuous if this melted Matter in the Centre of the World were equally distant from all the points of its circumference; for this being supposed, no man will deny, this melted Matter fixed in the Centre of the World, and Fire being put to it every where, and on all sides, to remain in fashion

*which greatly leads but then how*  
*Does this lead Commerce with Sun*



compensate for the heat of the heated Earth  
(137)

fashion as in a Crucible, and to have the same motion of *Circum-rotation* and *Libration* which we attribute to the Sun.

All the Obstacle we meet with at first sight consists in this (to wit) how this solar melted Matter can remain suspended, not falling down on any part. Secondly, By means of what Fire it remains always melted. Thirdly, How it comes to pass that since Gold so soon as it is cupellated or refined, remains in the Crucible in a fix'd Mass, yet the Sun which is like to this Gold, is neither fixed, nor stands it still immediately, but being wheeled perpetually round its Centre, it continues in motion, and is Librated in the Cupel without any intermission.

To the first of these difficulties I answer, that we ought not to stand upon it, because they who place the Earth in the Centre of the World, do teach us, that if a great hole were made through the Earth, even as far as our *Antipodes*, and if a Mill-Stone were thrown into it, it would stop in the middle, which is affirmed to be the Centre of the World, and there remain suspended; for to move forwards either way would be to ascend: The same thing may be

said of the Earth, if it were to be heated to such a degree, that it would be melted, and then it would be like to the Sun, and would be suspended in the middle of the Universe.

said likewise of Water or other Liquids which would remain suspended. If therefore the Sun be in the Centre of the World, why should it seem a wonder that it should remain there so suspended; since that may serve him instead of a Cupel?

As to the other difficulty which belongs to the Fire. I answer, that there is no want of that, because we have the fire of the fix'd Stars encompassing the Sun every where on all sides, and keeping this same Gold in continual fusion, as if it were under a great Winters Glove bored through every where with little holes, as we find in essaying Gold. I do not say with *Epicurus* that the fixed Stars are really little holes and apertures by which the empyrial Heaven which is altogether Fiery, transmits its Ardors; but I affirm, that these are either little empty holes, or else filled with so many Diamonds, or Chrystals, through which the heat of the Cœlestial Flames pass through; or else that they are as it were so many Carbuncles, or burning Coals. This is sufficient to convince them of great ignorance, who have affirmed these Cœlestial Fires to flow from the solar Globe, and to be borrowed thence; whereas on the contrary, they are Cœlestial

lestial Fires and Flames, which passing through this great Globe of the Heavens causes the Gold in the Cupel in the middle of the Universe to be boyled and wheeled round by an equidistant and equally distributed heat.

I confess as to what belongs to the third difficulty, it is very subtle, and supposes a very fair Experiment: For in the course of all my curious Labours, I have wondred how Gold after it had a long while smoaked in the Cupel, and circulated to expel in smoak all Foreign Bodies mixt with it, does at last stand still, and remains suddenly fix'd in the bottom, and is so condensed, that it cannot be melted again by the strongest fire, or made to circulate, unless Lead be added to it either with or without some other Mettal; for by the addition of these Bodies it is at the same time melted, and by the same degree of Fire, and begins a new to boyl, to be librated, and to be turned round as before: and it will continue so as long as the Lead or other foreign Matter is in it: From whence we may conclude, that so long as the Sun like melted Gold is wheeled round its Centre, mixt and infected with foreign Corpuscles which it receives on every side, as being placed in the Centre of the  
the

the World, and of the Planets, which like imperfect Mettals furnish it with Corpuscles which are exhaled and are emancipated, and being mixed with it cause it to wheel round, and supply it with matter for motion, and so long as he returns them back in the form of smoak, like a Vortex, excepting only those which are digested and turned into Gold, which he reserves within himself, and does farther digest and circulate; and when they are sufficiently subtilised and purged, although involved with grosser fumes does send them forth; which meeting with the Vortex of the Earth, penetrates into the pores of it, and are changed into Gold, Silver, or some other Metall; according to their greater or lesser purity, and according to the various disposition of the Matrixes or Beds wherein they lodge: So long I say we may conclude, that from these fumes which are sent towards the Sun from imperfect Bodies, are made a liquid and Mercurial Water, out of which, in the Bowels of the Earth, Gold and other mettals are made.

The experience which we acquire by essaying Gold, (although after a rude manner, in comparison of it with this great Natural Cupel) shews us this truth

this truth before our eyes; for I have with pleasure tryed, that the fumes arising from the common Cupels, being collected in an Alembick, are condensed into a clear viscus, pulverulent, or gritty, and consequently mettalline Water, whose value the curious may be able to know.

I represent therefore to my self Gold wheeled round in this great Cupel, which is the Sun it self placed in the middle of the World, and which emitting subtile fumes, receives other more gross, which it so long and so often circulates, that they being in the bosome of the Earth, (the matrix of seed, and only habitable Planet) purified and collected, do there make Gold, Silver, or other mettals. So the Sun is the Father of Mettals, and especially of Gold its Legitimate Off-Spring; whereas the others are only Bastards, and being defiled in the Matrix or Womb, they cannot attain to the Dignity of Gold, unless they are free'd from their original impurity.

He then that can tell how to purifie and consecrate these solar influences, which are the fumes of this admirable Cupel, hath found out a great secret in Nature, extreamly profitable both for Health, and Wealth. Let me tell you  
an

an Experiment which I did not see, but heard related, by the late *Monseigneur Bezancon*, a Gentleman well known in *Paris*, who professed himself an eye-witness of it.

He said that when he was Governour of *Provence*, he sav'd a Man's Life that was unjustly Condemned to dye, who in a grateful acknowledgement of it, shewed him a thing wonderful. This Man, said he, took a Vessel, in which he put three simple things, and buried them in the Earth, in a place exposed to the Sun-Beams, (which are the most subtile fumes) and having taken a Concave, Parabolick, or Burning-Glass, which he placed opposite to the place wherein the Vessel was put; the Sun Beams being collected and concentrated, descended into the Vessel in troops, in which, at length was found a very clear yellowish, and gritty Water; which being boyled in a Bolt-head, was brought into a Powder, and afterwards being put into a Crucible with Borax, turned into Gold: This was performed three several times. From this Experiment we must gather, whether or no the Sun Beams do supply Water and Flames serving to the production of Gold, which, as I have said, is the legitimate Son of the Sun, and is in the Earth the Image of its Father.

But

But to make an end of this digression, I conclude that the Sun will so long persevere in its Cupel in continual motion, and Circum-rotation, till these Planets shall deny it Vapours, for then it would receive no foreign Matter, but would be thoroughly purged, and so would be wheeled round no more, but would remain Fixed. The World it self, with its motion and circulation would be at an end, as well as all Generations, which proceed from this continual circulation, by which the seminal and Luminous Spirits are dispersed every where throughout the World.

I add another reflection concerning the Sun's motion, like the motion of Gold in the Cupel; to wit, that whilst the fire of the superiour Stars do without intermission heat the Body of the Sun, foreign Corpuscles through its Pores enter into it, nor is it ever at quiet till they go out again; for as much as the Figures of these Foreign Bodies can by no mean be accommodated to the figures of the Corpuscles of Gold, for they drive one another backwards and forwards (and from hence arises the *Equilibrium*, and agitation of the Atoms of Gold, which is in motion) and seeing that they cannot have a perpendicular motion

motion, unless they forsake the rest, they are compelled to turn round like a Horse in a Mill, which goes on, and thinks he goes straight forwards, when as he continually treads the same steps, in the same Circle: But to do this, there must be a propulsion on every side; for Gold would not be turned round in the Cupel, if Fire were only applyed to it from beneath, and not from above, and quite round it; which ought to be well taken notice of.

We will say then that the Sun cannot be moved about its own Centre, that is the Centre of the World; unless at the same time it moves the ambient Bodies, by the assistance of the Corpuscles coming out of its Globe like so many streams of Light, just as we see Rivers of Water flowing out of the Sea, and yet the Sea is never the less for this Effusion, no more than the Sun is lessened by a continual effusion of his Light; because it receives in as much as it pours out, and these Waters return back to the Sea, as these Corpuscles of Light do to the Sun, by a continual Circulation.



## C H A P. X.

*Of the Moon and its Changes.*

**T**He Moon is like an Optick Looking-Glass, in which Light and the Corpuscles flowing from the Sun are centred and gathered together; from whence for divers respects and changes they are sent towards the Earth.

One of the Antients affirmed the Moon to be a Planet, very near and familiar to the Earth, it is moved about the Sun, because it is in the solar Vortex by which it is carried round, and in it three kinds of Motions are observed (*viz.*) its Annual, Monthly, and Diurnal, from these divers motions, divers Aspects, in respect of the Sun and it do arise, from whence are its various yet constant appearances.

Its Figure is round, but its Mass is partly solid, partly fluid, like Earth and Water; its roundness appears at Full and New-Moons; without this roundness we could never see its increase or decrease. Its solidity is the Cause why the Light of the Sun is from thence reflected to us, even as by reason of its fluidity, we observe in it obscure parts like

X like Spots, because they do not reflect the Sun so much as the solid parts do; but if in the Body of the Moon there are some parts higher than others, in the shape of Mountains or Hills, the Sun Beams do there produce small shadows, which are observed by the help of Perspective Glasses.

That it cannot be half so big as the Earth, is proved by Optick Principles, Shades and Paralaxes; in respect of it self it is always in the full, because one half of it is continually illustrated by the Sun: But it does not always appear full to us, but only at the time of its Opposition and Recession from the Sun, and then also in respect of us it may be Eclipsed; because our Earth at that time is directly placed between it and the Sun, and by its shadow makes the Moon more or less obscure, as it is nearer or farther off and as it is *more* or *less* opposite to it. These two opposite points, in which, when the Moon suffers an Eclipse, those great Lights are found, Astrologers call the *Dragons Head*, and *Tail*. But as the Earth by its interposition is the Cause of the Moon's Eclipse, so also by the interposition of the Moon betwixt the Sun and the Earth, is produced an Eclipse of the Sun; which is either greater, or less, according as the Moon is more or less

X Why in general there be Clouds - the Moon  
atmospheric body as I say by the interposition

posited between us and the Sun, or is nearer or farther from us.

Lunar Eclipses can happen naturally, only in the time of Full Moon; but these of the Sun, in the time of New Moon. An Eclipse of the Moon may be Total and Universal. But that of the Sun can never, without a Miracle, be so at the same time; but this is not a real defect of light in the Body of the Sun, as it is in the Moon, which is a dark Body, and possesses only a borrowed Light. We may hear what Astronomical Philosophers and Astronomers say of it.

I told you before that the Sun is like melted Gold, I told you likewise by the way, that the Moon might be compared to melted Silver; but I think it may be truly said that its Matter, as to its Circumference, is more like to real Silver; but be it as it is, it continues in the manner we see it, suspended in one massie lump, a most subtile Ætherial matter, full of many empty spaces, being by the Creator shut up in its Circumference, which hinders the Moon chiefly from changing its place, and from being immersed more deeply in the Sun's Vortex, whose Atoms are indeed more thick and gross: By reason of its vacuities there is no fear that it should descend

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scend

ascend nearer the Sun, or be able to resist the impression of its Vortex, any more than the Earth, which has plenty of Pores, Cavities, and empty Spaces, without which it would too much resist the solar Vortex, and would be able to get nearer its Centre, that is, the Sun. But its empty Cavities hinder that, like Air contained in a Bladder, which hinders it from sinking to the bottom; and as the hollowness of the Quills of Birds bear them up in the Air.

The Moon in her daily motion finishes her Course round the Earth in the space of twenty four hours: or rather the Earth performs its daily motion about the Sun, and its own proper Centre, in twenty four hours time, the Moon being carried away by the same Solar Vortex with the Earth, is daily retarded some degrees, whereupon we say it rises every day later and later, until by this resistance or retrocession in twenty nine or thirty days it hath compleated its Monthly motion: And besides this Retrocession it is moved by the Libration of the Sun from one Tropick to another, and twice in every Month runs through the Equinoctial Line; after the same manner as the Earth does it twice every Year. There can be no Annual motion of the Moon,

Moon, unless about its own proper Centre. But I will wander no further about a matter meerly Astrological.

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## C H A P. XI.

*Of the Planets, Comets, and Fixed Stars.*

**S**ATURN, Jupiter, Mars, Venus, and Mercury, are Five wandring Stars, called Planets, of the same Nature with the Sun, but less pure; whose Corpuscles are sent and driven towards the Body of the Sun; they are likened to divers melted Mettals, and sparkling in Chrystalline or Adamantine Crucibles, and the Fire melting them, is that of the Sun and the Fixed Stars.

If it be asked why they are not joy-  
ned with the Sun? I answer, that they  
consist of a Matter full of many empty  
Spaces, and besides that, they daily dis-  
burthen themselves upon the Body of  
the Sun, and supply it with matter for  
depuration and refining: which the Sun  
sends back to them more subtilised, and  
they distill down these seminal and Met-  
talline Spirits upon the Earth. They

are diversely whirled about by the solar Vortex ; after which manner they obtain divers motions, as Astronomers teach us. Who affirm the Planets *Mars* and *Venus* to be less than the Earth, and the three others much greater ; although according to their Opinion, the Diameter of the Earth is three thousand five hundred Miles, but its circumference seven thousand Miles ; including the water, which together with the Earth, make up one Globe.

Comets according to *Aristotle* are Planets or Stars, produced *De Novo*, from Exhalations : By which saying, this Philosopher is compelled to place all Comets under the Moon, which is found to be an Error, by the experience of a great many Comets which have appeared above the Moon, and the Sun too; whither Exhalations from the Earth can never reach : All the time of their continuance they have a regular motion, for the explication of which, *Aristotle* could never assign them an *Intelligence* to guide them.

*Seneca*, the *Antients*, and *Copernicus*, teach that Comets have been produced from the beginning of the World, and the reason why we do not see them so often as we do the Planets, is because they

they are elevated too high above us, and since they have an excentrick motion, according to this Opinion, they sometimes, and for some continuance of time appear, that is to say then, when they descend into the Heaven of the Planets. But all these Opinions are very uncertain.

This is my Opinion, that if the Sun is Gold melted in the Cupel (as I really believe ; ) and that from thence Fumes and Vapours arise ; it is no hard matter to conceive that in the Solar Vortex, and in the Corpuscles exhaling from the Sun, a great part of them are very gross, thick, and inflammable ; which taking Fire, make these Comets we speak of ; whose motion is regularly directed by the Vortex of the Sun ; yet nevertheless this does not hinder but that some Comets may be generated nearer us, from Terrestrial Exhalations.

The fixed Stars are fastned to the Firmament as so many little Suns, they are as immoveable as the Heaven in which they are included ; nevertheless like the Sun they move about their Centres, although this motion be neither useful, profitable, nor necessary. And so nothing compels us to say that they are actually moved.

They are all said to be bigger than the Earth, and to be in number 1022; the Heaven in which they are, is said to be solid, clear, and transparent like Ice; and this is that Heaven which was made in the midst of the Waters, and which any one may represent to himself like a great Circle of Water congealed in the form of Chrystal: But according to my foregoing *Hypothesis*, I had rather say that the fix'd *Stars* are like so many round holes or Rings, furnished with so many large Diamonds or Carbuncles, which serve as a Medium or Vehicle to the light and heat of the Empyrial Heaven, as we have said already.

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## C H A P. XII.

### *Of Meteors in the Air.*

**A**RISTOTLE hath constituted two sorts of Bodies, to wit, Simple, and Mixt; he placeth Meteors under these latter, but he calls them imperfect mixt Bodies, because he did believe them not to have a substantial form, as perfect Bodies have, nor to be produced by the ordinary way of Generation.

This Doctrine is contrary to our Principles;



principles; for we say that those Meteors which we see in the Air, are in their kind and condition perfect Bodies not differing from others, neither in respect of Matter, which is one and the same to them all, nor in respect of substantial form produced in the formation of them; for we acknowledge no such forms, but as unprofitable, and Chimerical. All the difference which we take notice of betwixt them, ought to be taken upon the account of their formation and different conditions under which one and the same Matter, that is to say Atoms, do meet together by a disposition of their parts, by an addition of strange Bodies, by an introduction of Vacuities, and by a conversion of their Figures. After this manner are formed Clouds, which are the Meteors of the middle Region of the Air, and which have Water, Air, and Earth for their Matter; for from the Vapours of Water, and the subtile particles of Earth, together with the Air with which they are carried up, Clouds are formed, which are sometimes so thick, that they rob us of the Suns Light, which happens when more of Earth, than of Air or Water goes into their composition: On the other hand sometimes they are so subtile, that they

*Some Clouds are formed by the condensation of the vapours of the Earth, and some by the condensation of the vapours of the Air, and some by the condensation of the vapours of the Water.*

can hardly or not at all be seen by us, which happens when air obtains the chief place in their composition: for in a word, Clouds are nothing else but a congregation and mixture of Corpuscles or little Bodies of Earth, Water, and Air, which are the proximate Matter of them; the Vortex of the Sun, the Motion of the Earth, and the Winds, are the three concurring Causes of their mixtion and elevation into the upper Region of the Air.

Other sorts of Meteors are Rains descending from the middle Region of the Air, and generated from the solution of Clouds; that is to say, when Water, which hath the greatest share in their formation, freeing it self from the particles of Earth, and parts of Air, thence forward distill as it were by an Alembick, which happens, because its particles being incrassated by the coldness of the Air, the water is separated from the Air, and falls down again to the place from whence it came, in the form of little drops: From this Rain proceeds the Earths Fruitfulness, for it never descends, but it brings some portion of the little seminal Bodies flowing along with it. In Rains therefore is contained Salt, and the Balsom of the Stars, which *Basilins Valentinus* speaks of, and

and from hence all Vegetables bud and increase. The Curious enquirers into Nature may try whether I speak truth or no, and whether they may not find a Salt as white as Sugar, if they take away by Distillation the unprofitable parts with which it is involved.

Dew is almost of the same nature with Rain, only it is more pure, more subtle, and more fruitful, by reason of the Seasons of the Year which chiefly enjoy it, (*viz.*) at the time of the *Æquinoxes*, when the Sun and the Earth are nearest to each other, which happens when the Earth passes the *Æquator*; wherefore at that time it receives and carries along with it a greater number of solar Corpuscles, depurated by his motion, than Rain, or Dew it self that falls at other times. Dew falls down in round drops, because its Corpuscles are round, and its Atoms are of the same Figure with the Sun, whether whole or in parts.

Dew penetrates the Earth, and moistens those places where there are seldom Rains: But the Sun's shining Beams presently carry it away along with them into the Vortex; in the mean time, part of this Salt or Balsom of the Stars contained in the Dew, remains upon the Herbs and Flowers,

where we observe a kind of Viscousness like Sugar, or Honey; thus Bees gathering this Dew, lade themselves with it, and make Honey of it: This Dew in the Hot Countries of *Palestine*, *Aegypt*, *Arabia*, and *Calabria*, is condensed into little Grains which are called *Manna*. From this same Matter Sugar is made in the *Madera-Islands*, and in both the *Indies*, where it is found inclosed in Reeds. Lastly, after the same manner Pearls are formed and nourished in Shells. He that studies to know the wonders of Dew, and the vertue of the Spirits it contains, may extract from thence admirable secrets for health, but for nothing else that I know of.

### C H A P. XIII.

*Of Winds, Tempests, and Whirl-winds.*

**W**inds are the same thing in the Air, as Billows are in the Sea, or as Floods are upon Land. And indeed they do sometimes disturb and move the Air so violently, that the best rooted Trees, and strongest built Houses, are now and then pulled up by the Roots, and overturned by them: And yet Winds are nothing but Air agitated, nor Tempests, but Air-floods, or violent Agitations of the Air. Some

Some Philosophers seek for the Causes of these Agitations of Air, in the Rarefaction and Condensation of Bodies; and to illustrate this Effect, they bring an Experiment of Air rarified, and going out with great force, out of a large glass Bottle, and of Air condensed in another Phial or Glass, in which the least opening being made, the external Air breaks in with great Force and Noise; of both which Experiments, I with others have been an Eye-witness. We took therefore, a great round Bottle, and placed it in a cold place, and then covering it with a double Skin made wet, it was placed to a gentle Fire; which by degrees being thorowly hot, and the Skin prickt with a Needle, the Air or Wind broke out from thence with so much violence, that it blew out a Candle two Paces distant from it, more than once. The same Tryal was made with another Bottle, in which Pease were put, and the Hole shut with the Thumb, which afterwards being taken away, the Air immediately with the Pease, burst out with so much Violence, that they like Pistol Bullets entred into a Deal-board. A second Experiment was likewise made, a Bottle was placed in a hot place, and well stopped with Leather, which

which being brought into a cold place, and the Skin pierced through, the external Air for half a quarter of an hours time, rushed into the Bottle with so much noise and hissing, that it seemed to endanger the breaking of it.

I confess these Experiments have left us an Idea of Winds and their vehemency, but there always remains this one difficulty, (to wit) what should be the Principle of this rarefaction and condensation of the Air; for in the first Experiment, refrigerated Air is shut up in the Glass Bottle, and dilated with heat, and then it goes violently out of the little hole that is made; but how can Cold condense, and Heat rarifie and dilate this Air? Lastly, what is it that presses it, and forceth it with violence to seek its Exit? And as to the second Experiment, in which rarified Air is condensed in the Bottle; how being rarified, can part of the Glass remain empty? And lastly, from what Cause is the external Air forced to break in with so much precipitation. All these things I mention, that it may be seen that these difficulties do not escape me. As to the first instance, I say that Cold condenses Air, in as much as it makes the vacuities dispersed through it lesser and more closely

*There cannot be more matter in it  
is more expanded*  
179  
closely shut together; so that there is  
much more of matter in refrigerated Air,  
than in the same made Hot: X But that  
this Doctrine may be rightly apprehen-  
ded, we must know in What Heat and  
Cold consists; for when Cold conden-  
ses the Air and presses it together, it  
performs it by its close, solid, heavy, and  
plain particles, as shall be treated of  
elsewhere.

Secondly, Heat rarifies Air by an in-  
troduction of its Corpuscles, which are  
almost destitute of all solidity, by which  
the vacuities of the Air are increased,  
and enlarged.

Thirdly, the Air rushes forcibly out  
of the Bottle, because their Corpuscles  
are compelled to dilate themselves, which  
they cannot do; nay, from hence they  
break the Glass Bottle, unless a hole be  
made in the skin. It is true also, that  
the Air going out of the hot Bottle is  
altogether Cold, for they are the Corpus-  
cles of Cold which go out, and the  
noise with which they break out proceeds  
from the plain figures of the Corpuscles  
of Cold, which cannot pass through the  
little round holes without being en-  
tangled together, and dashing one a-  
gainst another; besides these Corpus-  
cles being plain, they are subtile  
also

also like little Razers; thus in the Winter time we see the hands and feet of such as are tender hurt with Chops and Cliffs.

To the second Experiment I say, that the Air in the Bottle being rarified by the help of Heat, is afterwards compressed and condensed by the help of Cold, passing through the substance of the Glass, and breaking of it if it be not looked after. Secondly, the cold entring in, drives out or into the sides the particles of Heat, and the Glass on the part of its Orifice remains without Air, and the disseminated Vacuities are gathered together into one Vacuum. Thirdly, the external Air enters with precipitation, because it is pressed against its Nature by this great Cold; and finding a place where to betake it self, it possesseth it immediately. We must here observe that rarefaction is never made on the one side, but condensation is made on the other; and so on the contrary, and this is the first or immediate Cause of Winds, when the Air is rarified by heat in subterraneous places, and Caverns of the Earth, and breaks out with violence, or when it being condensed, other supervenes with violence rushing towards it

Another Cause of Winds, or rather of Tempests and Storms by Sea and Land,

*but the heated air moves are*



are the emancipated Atoms of which we have spoke already; and which by justling one another, more agitate the Air from divers parts, diversly opposite, from whence comes the reciprocal meeting and incurſion of winds in the Region of the air, which when they happen near the Earth, they cause fearful and dangerous Whirlwinds.

This Opinion concerning the emancipation of Atoms, ſuppoſes that in the diſſolution of greater Bodies, the leſſer Particles and Atoms are emancipated, and procure themſelves liberty, ſo that enjoying their own power they run through the Air, and eaſily and vehemently move it. Theſe emancipated Atoms in the great World are not only very much to be feared where they uſe greateſt violence, but alſo in the little World, where they produce moſt Diſeaſes, as are Horrors, Fits of Feavers, and their duplications, Tranſlations to the Brain, Diliriums or Light-headedneſs, and Phrenſies: To Cure which, Sudorifick Medicines opening the Pores, and driving out thoſe ſharp-pointed Atoms, are chiefly to be commended.

CHAP.

*escape from the wind & be  
born & if the bulk of the bottle  
is a vacuum when the sealed  
air -*

## C H A P. XIV.

*Of Thunder, Lightning, and the Thunder-Bolt.*

**T**Hunder, Lightning, and the Thunder-Bolt would be more stupendious, were it not that there is something on Earth, from whence we learn the manner how these things are done above us.

The first thing which gives us light concerning these three Meteors, is the shooting off of a Gun, for the Thunder-Bolt is represented by the Bullet, the Fire coming out of the Muzzle represents Lightning, and the Report from thence holds the place of Thunder.

Another thing which gives us a lively and more just Idea of them, is *Aurum Fulminans*, which like the Thunder-Bolt carries its stroak downwards; three Grains of which, though never so little made hot, takes Fire, and gives a greater Report than two Ounces of Gunpowder. I will shew you its preparation in the following Chapter, and give you an account of it, and I will endeavour to Explain how it comes to Thunder, and how

how the Thunder-Bolt falls.

*Epicurus* attributes the falling of the Thunder-Bolt to the apertures which the Winds produce in the Clouds, but the Lightning he thinks arises when the Thunder-Bolt, by reason of its violent motion in the Air, takes Fire, or, saith this Philosopher, the Flame of the Lightning is excited by the mutual meeting of Clouds, which are Bodies made hard by vehement Cold ; or else that it is excited by the blowing of Winds, or by the heat of the Stars, which sets on Fire the Nitrous and Sulphurous Matter collected in the Cavity of the Clouds.

The sound of Thunder may be divers ways. First, by the revolution of a strange Body contained in the thickness of the Clouds, and rolled through it, as we see a solid Body shut up in a Pot, excites a sound and murmuring noise if the Pot be moved. The same noise may likewise proceed from the breaking or bursting of the Clouds, as well as it does from the bursting of a blown-Bladder, or Paper suddenly and forcibly extended, or the Sail of a Ship torn by the violence of the Winds.

In like manner, this sound may be caused from the mutual meeting together of hardened Clouds, like that we hear,  
when

when pieces or flakes of Ice dash one against another, either in the River or on the Bank; after the same manner also Woods indeed stirred by the Winds, the flowings of the Sea interrupted, Linnen and Paper suspended in the Air, by their violent motions excite sounds, like the sound of Thunder.

We may say besides, that the Thunder-Bolt being thoroughly lighted, and falling upon a moist Cloud excites a great noise, such as we hear when red hot Iron is thrown into Water, or melted Mettals into Oyle, Urine, Honey, or the Lees of Wine: where we also find a certain kind of murmur, and at last we percieve so great a noise or sound, that it threatens the breaking of the Vessel. But this mighty noise may be ascribed to the vehement separation of the Salt, Nitre, and Sulphur, which being mixt together are included in the Thunder-Bolt, and the Cloud, as Gun-powder is in Guns and Mines. For the violent and sudden separation of Nitre and Sulphur forcibly separates all Bodies near them, which cannot be done without a mighty sound. Therefore that we may the better comprehend the Nature and wonderful effects of this Meteor, I will make the following digression concerning *Aurum Fulminans*.

CHAP.

## C H A P. XV.

*Of Aurum Fulminans, or Gold imitating Thunder.*

**E**Xperience shews us upon Earth a much more Natural Image or Representation of Thunder, than that which is seen in the effects of Gun-powder; and the noise and disturbance which this Gold when set on fire produceth, doth so properly imitate the horrid noise of Thunder; that for this Reason it is called *Aurum-Fulminans*. I will here give you its preparation, and I shall endeavour to give the Reasons of its wonderful effects, and apply them to the production of Thunder and Lightning.

Take therefore (for Example) one Ounce of calcined Gold, or leaf Gold, or else Gold dust, and put it into a Bolt head, and pour to it three Ounces of *Aqua Regis*, which being done, place it upon hot ashes, and the Gold will dissolve, and be reduced into Water; to which pour on a sufficient quantity of fair Water, and after that a few drops of Oyle of Tartar, for then that will cause an ebullition or boyling; which being over, the Gold will fall to the bottom,  
in

in the form of Dust; then afterwards pour off the Water that swims a top by gently stooping the Vessel, and dry the powder in the Air, so have you *Aurum Fulminans*, for it produceth all the Effects we told you of.

The Reason why it so soon takes Fire, is taken from the Atoms or Corpuscles of Nitre, which are in *Aqua-Regis*, as also of the Sulphur, Vitriol, and *Sal Armoniack* of which it is made; these Sulphurous, and Acid, and Volatile Salts are united together, and the precipitated particles of Gold, (for as much as the particles of the Salt of *Tartar* possess their place) dissolve their Union, and force them to give way and be separated; so that nothing remains in the Water but a dissolved Salt, part of which adhering to the Atoms of Gold, falls to the bottom with them, as the increased weight of the Powder evinces: These same Particles therefore which remain in the Powder, stick to the Gold, so that Heat penetrating this, and dilating this Matter, produces a sudden and violent separation; hence it is that the Spirits of the Volatile Salts being made hot, rarified, subtilised, and set on fire; the Gold which before was fix'd, being accompanied with these Spirits, flies away with a Thundring noise,

noise, by reason of the contrariety that is between the alcalous Salt of *Tartar*, and the acid Salts, as it happens in Gunpowder, where the Alkali that is in the Charcoal produces the same Effect as is seen in this Thundring Gold; excepting that the stroak of the Gold and its explosion is made downwards, by reason of its fixity and weight.

We see the same in the Thunder-Bolt, for the stroak is made downwards, the Flash is seen, and the noise is heard: Besides the Thunder-Bolt produces wonderful Effects, such as are consuming of Wine in the Vessel, melting of the Sword in the Scabbard, the Scabbard and the Vessel being both untouched.

Therefore I conclude, that the stroak of Thunder moves downwards, as well as *Aurum-Fulminans*; because these terrestrial Particles predominating, they fix the Volatile Spirits of the Salts, and precipitate them downwards. The Flash arises only from the rarefaction and emancipation of the solar and Cœlestial Particles therein contained; but the noise in *Aurum-Fulminans*, as well as in Thunder, is produced by the violent separation of the more solid and more fixedly-adhering Particles or Atoms. But Thunder consumes Wine in the Vessel, the Vessel being

ing unhurt, because it consists of emancipated Atoms, which are therefore so subtil, that they penetrate the Vessel, subtilise and rarefie the Wine, and convert it into Atoms, which pass through the Vessel, and flye away into the Air; but in *Aurum-Fulminans* the strength of the Volatile Spirits not being sufficient to raise the Gold on high, it is carried downwards.

The Principle of this wonderful Effect relies upon this Truth, (to wit) that subtil Bodies are more subtilised, Volatile Bodies more Volatile, and fix'd Bodies rendred more fix'd.

For this Reason, the Powder of projection so called, being cast into melted Mettal that is not fixed, penetrates it, and fixeth it by its own fixity: But this Experience is not yet found, but is still to be found out; so that no Experience can be taken from a thing that is not equally as certain and as common as *Aurum-Fulminans*, and Gun-powder; which if there be such a Powder, and it be such as they report it, it is a Miracle, both of Art, and Nature.



## C H A P. XVI.

*Of Hail, Snow, Frost, &c.*

**H**A I L descending from the Clouds, and falling down with violence, is composed of Drops of Water hardened by Cold, and it falls down with violence, because it is expelled the Clouds by a strong expression; almost after the same manner as your smallest Shot are discharged out of a Musquet.

✕ Snow is Water congealed in the form of Froth; the flakes of it in its falling are puffed up, and filled with Air, which makes it very porous and light: it contains also many terrestrial particles, as appears in dissolving it, it is white, but may be made black by a sole inversion of its Atoms. There are also in it many fiery particles, which warm the hands of those that long handle it. *Nitro*

There is another kind of Hail also, which falls in the Spring time, it is like your smallest Shot, or your Seeds of Coriander: This only differs from Snow in the purity of its parts, or in as much as it hath more Vacuities in it than there are in Snow; and on the contrary, Snow has more of Air and Fire in it than this.

*Hail may be congealed rain - snow kind  
congealed into moist & separated before rain*

*perhaps in some of these cases the hail is made by the transpiration of the water of the earth into the air, and then it is congealed by the cold of the air.*

kind of Hail, but both of them are, by the help of Heat dissolving their parts, reduced into Water.

X Hoary Frost is Air incrassated by Cold, and congealed upon the boughs of Trees, upon the Hair of Travellers, and upon the Herbs of the Field; and it is called white Ice: In this Chrystalline whiteness a bloody redness is included, which may be extracted out of this Hoary Frost, and which, if it be well prepared, conduceth very much to Health.

## C H A P. XVII.

*Of the Rain-Bow, Halo, and Parelæ.*

**T**He Rain-Bow is the most beautiful of all Meteors, and the Miracle of Nature; it is seen when the Sun either rising or setting darts his Rays upon a Cloud full of little globular suspended drops of Water, which by diversly breaking and reflecting the light, produce that diversity of Colours which we observe in it, which ceases either by a different position of the Cloud, or by the absence of the Sun.

This Meteor appears like a Beautiful Arch, adorned with all manner of Co-

X This Rainbow is the same as the Parelæ, it is exactly similar —

lours, which happens for as much as the Sun looks only upon its superficies, and then when it is rising, or setting, and the Clouds are either in the North, or in the South.

Some will have these Colours of the Rainbow to be only appearances, and by no means real; but this is an Error, for there is nothing hinders but that these may be equally as real as all other, though they are not so lasting.

An *Halo* is the appearance of a Circle about the Moon, which ariseth from a gross and thick Cloud, upon which the Lunar rays fall directly, so that its middle is made pervious to them, and broke through by them, though the circumference be not, which is therefore the appearing Circle, and which is not as it is vulgarly imagined, nigh to the Moon, but it is in the expansion of the Air, and far remote from the Moon.

*Parhelie* are counterfeit Suns, formed in the Clouds, either by the reflection or refraction of his Beams, just as we see them in Water, where sometimes many Suns are seen, though there was never more than one. We may say likewise, that the Clouds in respect of us are like those prospective Looking-glasses, which represent many Images of one thing pla-

*See also rays. K one those of rays & ced  
a reflection of reflection of houses from the Sun!*

ced upon a Table, which one thing is only real, and all the rest imaginary: Yet this does not hinder, but that these Parheliæ may be true Lights, and Suns Painted without Artifice.

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## C H A P. XVIII.

### *Of Air, its Substance, and Quality.*

**A**IR is that Element out of which the Meteors are formed which we speak of: Its substance is most subtile, and most fluid, by reason of the Vacuities dispersed through it. It is nevertheless thicker and heavier in the lowest Region, by reason of the mixture of Corpuscles coming out of the Earth and Water.

Some think it only a mixture of the little Bodies or particles of Earth and Water; whereupon the quality of the Air we breathe in, depends upon the Climate which we inhabit: So that Air is not every where alike wholesome, but very unwholesome in Moorish and Fenny Grounds, from whence ordinarily gross and malignant Vapours, thick and putrid Clouds arise, which we take in when we draw our breaths.

The

The very same Air we breathe in, and which, when we take our breath, preserves our Lives by its wholesome gales, is able to bring Death to us, when it comes laden with sharp particles, which in their passage vellicate the Lungs, and cause most vehement coughings.

Oftentimes also emancipated, pointed, and penetrating Atoms flow in the Air, which entring in at the Pores of the Body, disturb its whole Oeconomy or frame: Others ascending by the Nostrils to the Brain, stick to its membranes, and produce Pains and Convulsions, and are the Causes of violent Head-achs, Vertigoes, and Apoplexies: And there are some also which penetrating the Organs of hearing, cause hummings and noises there, which continue for some time, because their particles are of a figure fit for adhesion.

The Air most malignant, and most to be feared, is that which is pestilent, by reason of the Atoms which come out from putrid and corrupt Bodies, as we have said elsewhere.

The fluidness of the Air does not arise from its not being compounded of solid and material Atoms, but from its being rare, or loose; and it is rare, because its parts are far distant from one another: This distance necessarily is

space, this space is again either full or empty ; if empty, we have rightly concluded that there are disseminate Vacuities, if full, it must be material. Let there be therefore material Atoms, all which mutually touch one another, and all things will be solid, and there will be nothing fluid in all Nature, unless we acknowledge dispersed Vacuities, from whence the rareness and fluidness of Bodies arises, as shall be more fully discoursed of.

*The End of the Second Part of Physick.*

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### **The Third Part of Physick.**

*Of those Things which are under a Man; (viz.) of Earth, and things Terrestrial, which are called Inanimate.*

**H**AVING discoursed of those Things which are, and happen above us, it is time now that we speak of those Things also, which are under, or beneath us, as also of all Things worth taking notice of in the Earth and Water, which constitute one Globe, which  
we

we call Terrestrial. But in this Part we will consider Terrestrial Things only as they are inanimate, according to the common Opinion.

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## C H A P. I.

### *Of Earth and Water in general.*

**T**HE Earth as hath been said, is a Planet habitable, having three Motions: The First of these is about its own proper Centre, which is not the Centre of the World, for the Circle of the Earth is Excentrick: This motion is impressed upon it by the Solar Vortex, as a greater Wheel carries a less along with it, and this is called its Diurnal motion. Another is about the Sun, as the Centre of the World, to which it is Concentrical, and requires a Years time to return to the same point; and this arises likewise from the Solar Vortex, for the Earth, being driven on by the Flux of the Centre of the Universe, cannot be moved about its proper Centre, without sensibly making an Excentrick Circle: And from this two-fold Motion of it arises the other third, (*viz.*) from one Pole to the other in the space of one six Months, and returning back again in the

space of six other; which happens, because it can go no farther, nor pass the Tropick, unless it recedes from the Solar Circle, for here it hath only the Latitude of the Ecliptick. For if it should recede, it must ascend too, for whatsoever recedes from the Centre of the Universe, in respect of that ascends, and so likewise from its proper Centre.

The Earth in all these motions carries the Water along with it, for they both make but one and the same Globe, which is altogether exact and regular on the Seas part, but less accurate on the Earth's part, by reason of the Vales and Mountains. And though it be true that the Earth does not seem to us to be of a round Figure, yet it is proved by Experience; for that teaches us, that the last part of the Ship which can be seen by those on shoar is the top of the Mast, and the first Things they on Ship-board see as they approach their Haven, are the tops of Towers: From whence it may evidently appear, that the Sea is as it were a Belly, and eminence, which insensibly is lifted up into a convexity, that so with the Earth it may constitute one entire Globe.

Earth and Water are two immediate Principles of all Compounds which are.



are to be seen in this lower Region of the World; yet notwithstanding, not they, but Atoms are the first Elements, as it is said else-where: There is moreover a lesser number of Vacuities in Terrestrial than in Aqueous Bodies; and this is the Cause that the Earth is more solid, and the Water more fluid, that is to say, less solid than the Earth. *X Water contains the 4 elements - fine & porous - air on which fishes subsist & to respiration -*

*dearth explained in comparison -*  
**C H A P. II.**  
*Of Terrestrial Inanimate Bodies in general.*

**T**Here is nothing Simple, but God, an Angel, the Rational Soul, Atoms, and a Vacuum. God is essentially Simple in a simplicity of Essence, Power, and Act; for whatsoever is in him is an act, his Essence is no ways compounded, nor his Power idle, nor his Action ever interrupted. *X* An Angel is simple in respect of essence, but his power is not always in act, nor his action (at least the same) without intermission. The Rational Soul, which *X* is a Spirit laid in pledge, or at least a Physical Compound with an Organical Body, is simple, because it hath neither Integral, Physical, nor contained parts;

B 4

but

*X How then can the mosaic acc. of Creation be true when all is...*

but it self is a Physical Part, saving only that its powers are often idle, and its actions are changed and interrupted; A Vacuum is simple, for since it is neither a Spirit, nor Matter, nor any thing else but a capacity of receiving a Body, and it hath an essential emptiness; it cannot be called simple, but for as much as it cannot suffer composition by reason of its imperfection. Lastly, Atoms are simple, because they are indivisible, and the first Elements of Bodies, out of which all compound Bodies are framed.

I acknowledge no other Elements, no other substantial material forms in Bodies; for they are not only unnecessary, but impossible: Yet it doth not follow from thence, that the diversity which occurs between Bodies constituting the World, and which are the Compounds of the lower World, is no other than meerly accidental, and not at all essential: for, according to our Principles, we determine one composition to be *substantially* distinguished from another, by Atoms, which are the first Principles of its composition, and *essentially* by the manner of composition, that is, by the disposition and ordination of its Atoms, Corpuscles, and all its parts.

They who conclude that there is no  
Physical

Physical Compound without a substantial form, think Matter alone with its diverse Figures, and in all its dispositions, cannot possibly be the Cause of the special Properties which we observe in every one Body, and that therefore a form distinct from Matter is required to produce qualities proper to every one compound Body. As for Example, Earth is in its Nature dry, and Water is cold; which could not happen, unless Earth did obtain a substantial form, which is dryness; and Water such a one as Cold requires. This is that form which restores dryness to the Earth, and Cold to the Water, when they are put out of their Natural State and condition, to wit, by introducing moisture into the first, and heat into the latter.

This Objection how strong so ever it may seem, is nevertheless but vain; for we say that neither the moisture of Water, nor the dryness of Earth are Accidental Qualities; so that this ought to grieve none but those who acknowledge Accidental Qualities distinct from Matter.

Ours is quite another Opinion, and our Language quite otherwise: For we firmly conclude, That all Compound Bodies which are in the World, are compounded of Matter, every thing else

being excluded; and that all contingent changes in them arise from Matter newly added, or taken away, or changing place, or by some confused Atoms or Corpuscles brought thither from else-where; or lastly, by the more notable parts changing place, or other ways disposed by the Action of external Agents.

### C H A P. III.

*Of the various Qualities to be observed in Compound Bodies.*

**T** Here is a difference betwixt the Qualities of Simple Elements which are Atoms, and the Qualities of Bodies compounded of them; for the First as well as Atoms are immutable and incorruptible; the others as well as the compound Bodies are mutable and fleeting. For indeed Propriety follows the Nature of that Being of which it is the propriety: So that if Atoms are immutable by their solidity, the same must be said of their Qualities; but Bodies compounded of many distinct Parts, are forced to be changed, as often as their parts change places, or are wholly separated.

That which is corrupted, as well as that

only these can be so diversified in nature, they cannot be so diversified in substance. They were compounded of many

that which is generated *De Novo*, is a Composition ; for as corruption is a division of substance, so generation is a composition of it.

To Explain this Opinion, There is nothing more commodious than the example of Syllables, and Words: For truly Letters are immutable indeed, and according to their different place they vary a Syllable or Word without changing their figure, substance, and essence, remaining always the same, in what state or disposition soever they are placed ; and it is certain that the Twenty four Letters serve to the composition of all Syllables, Words, Sayings, Discourses, nay, of all the Books which are Composed in the World. And even as words, Sayings, Syllables, Discourses, and Books themselves are changed, the Letters being still the same unvaried ; so also the greater and lesser compound Bodies are changed and corrupted, the Atoms being unchanged, and remaining the same ; nothing new happens to them, unless it be that they are no more the parts of one compound, but may be of a second, third, and others, successively to the end of the World. When all Generations, Corruptions, and Motions in things of Nature shall cease.

Letters

Letters are the true Image of Atoms in respect of the composition or division of Things: And as the substance, essence, and quality of Words depend upon Syllables, and Syllables upon Letters and their disposition: So after the same manner, the substance, essence, and quality of Bodies, arises from Corpuscles or smaller Bodies, and the diversity of These from Atoms and their various dispositions.

From these principles may be taken away a question no less agitated, than unprofitable in the Schools: (*viz.*) whether in the corruption of Bodies a reduction or resolution of the compound may be made, even unto the very first Matter. To this it may be answered, that this reduction is continually made, in respect of some emancipated Atoms, but not in respect of all Atoms, for the division is not always so general, as that all the Atoms should be entirely separated, and the small number of those which fly away is scarce able to be taken notice of; besides that, they almost all mutually adhere together, or it is seldom but they meet with others, to which they remain affixed, or with Bodies into which they enter, or on which they are stayed.

CHAP.

## C H A P. IV.

*Of the special Qualities depending upon  
the Composition of Bodies.*

**O**UR Doctrine rests upon two general Principles, that is to say, the *Doctrine of Atoms*, and of a *Vacuum*. Atoms are the first Elements of Bodies, because forsooth, in their universal and radical division and solution they are reduced into them, and the division can proceed no farther. And a Vacuum is necessary to the explaining the motion of Bodies, and to the giving a reason of the diverse and particular qualities of every one compound Body: For there are Bodies thin and thick, transparent and diaphanous as Air, and Glass; thick and dark as the Earth; and lastly, dry, and moist, hard, and soft, solid, and fluid.

We will begin with thickness, and thinness, the Parents of so great difficulties to the Followers of *Cartesius*, and *Aristotle*: and I determine one Body to be more thin than another, when it is endowed either with greater Vacuities, or with a greater number of them; so Air is thinner than Water, and on the other hand,

hand, Water is thicker than Air, because Air has more and greater Vacuities than Water; and this is thicker than Air, because this has fewer, and lesser.

They that reject a Vacuum, and set up a Plenitude, find themselves very much intricated, when they are compelled to say wherein the thinness and thickness of Bodies consist? for if they say that either of them is a quality, or accidental form, brought out of Matter in power, or out of the power of Matter, they conceive not what they say, nor can they assign the Nature of these imaginary forms. But if with *Cartesius* they say, that there is much more of the *Materia Subtilis*, or subtile Matter, in thin Bodies, than there is in thick and condensed Bodies; I would ask them, why this Matter is more subtile and delicate than all other Matter, for as much as all Matter is equally gross and solid? But then they will say, that this Matter is highly rarified. Yet nevertheless the same difficulty remains still, (*viz.*) how it comes to be more rarified? They will say that it arises from this, that its parts are not so much compressed, therefore they will be at a greater distance from one another: For that Cause there are Vacuities, and Intervals: For unless they



they be granted, the parts are alike compressed in That, as well as in condensed Matter. If they are alike compressed, than they are not more remote from one another ; and lastly, if they be not more remote from one another, they are no more rarified, and so this subtile Matter will be no less gross than any other.

We therefore explain the thickness and thinness of Bodies in a more easie Method than these Philosophers, and the reason which we give of them is more clear and more Natural than theirs : It is the same thing concerning clear, bright, and dark Bodies ; and we say a Body is more or less pellucid or transparent, as it possesses a greater or lesser number of Vacuities, or as they are placed in a right or oblique Line ; so Air, for Example, is pellucid at a certain distance, by reason of the great number of its great Vacuities ; and Glass is transparent, by reason of the Vacuities dispersed through it, which are placed in a right Line, and are very long, as they are observed to be by the help of a new Microscope.

The moisture and dryness of Bodies arises from a mixtion of Atoms, or Particles either of Air or Water predominating : For if the Aqueous Particles  
pre-

predominate, the Composition is moist ; if on the contrary, the Earth is more eminent, it will be dry ; and it may be justly said, that moisture is nothing else but moist Bodies, which are Air and Water, as they insinuate themselves into Compounds, which are therefore moist by reason of their presence, and dry when they are evaporated : After the same manner as it happens to Wood which hath a long time lain in the Water, and becomes dry by the evaporation of that Water which it was full of. A Linnen cloth dipped in Water, and taken out from thence, is more heavy, because its pores are filled with Water, and it remains moist, and equally heavy, until the Corpuscles of Water are exhaled and evaporated, which suffices to make it afterwards dry and light, without the addition of two Physical Accidents, distinct from Matter. Water therefore, to speak properly, is not moist, but the moisture it self that moistens all things.

From the same Fountain the hardness and softness of Bodies arises ; for a Body is soft when it yields to the hand that touches, and the less it resists, the softer it is, but if it hath no sensible resistance, it is fluid like Air, but if it hath a little

more

Hence it is, that the water is moist, & dry, in different degrees, according to the quantity of the Air mixed with it.

more than that, then it is Liquid as Water, in which if with your hand you thrust a Stick, it enters and goes even to the bottom. It is otherwise in a soft Body, as Wax, and Flesh, into which indeed one may thrust ones Finger, but it finds some kind of resistance, and there are always found some compressed Particles that strongly resist: All which arises from the disposition of the little Bodies, Atoms, and dispersed Vacuities, for an Atom being in its own Nature Solid, is resisting and impenetrable to another; and if all things were so filled with Atoms, as that there should be no Vacuum, all things would be hard and impenetrable; nor would softness, fluidness, or liquidness be found in any Body, but there would be every where hardness, and an impenetrable resistency; but a Vacuum which alone does not resist, as it is more or less mixt with Bodies, renders them less resisting, more soft, more liquid, and more fluid: to which may be added the figure of Atoms, which is more or less fit for Motion, and which admits of more or less intervals or Vacuities.

## CHAP.

*in a great cold the harron  
are so compressed that you can force  
a bar of Iron into the body, which is not*

*What the great compression is Resisting of the water  
concerning the figure of the particles is doubtless, which does not*

## C H A P. V.

*Of the Quantity, Weight, and Figure  
of Compounds.*

**T**He same three Properties which constitute the Essence of Atoms, are found likewise in Compound Bodies: Atoms have a certain *quantity* or grossness, and obtain also *weight* and *Figure*, but they differ only in respect of their Figures. This magnitude or grossness of Atoms, which we find out by reason only, is visible to the Eye in compound Bodies.

The quantity or grossness of compound Bodies arises from the addition and gathering together of Atoms, and of little Bodies which are thus formed of them; which again is lessened by taking away the same Atoms or little Bodies.

Besides this General Cause of greatness, magnitude, and grossness, we yet acknowledge two others, (*viz.*) an Exterior, and an Interior; the first of these regards Artificial Compounds, where the Artificer as an External Cause encreaseth or diminisheth Matter as he thinks fit: But it is otherwise in Natural Compounds, whose Magnitude and thick-

thickness arises from the magnitude of Corpuscles, and their grossness, and from the figure of the Atoms determining Bodies to such or such a magnitude: So that each Tree, Fruit, and Animal obtains a Natural and determinate magnitude and grossness, in respect of the magnitude and grossness of the little Bodies, and the figure of the Atoms contained in their Seeds: Hence it is that Giants beget Giants, nor do Dwarfs ever come from Tall Parents: But if in either kind the individuals are unequal to their Sires, it happens accidentally, by reason of hindrances caused by contrary Agents, or by a defect or an excess of Matter, or lastly, by an intromission of many strange Bodies which in some particular individuals produce this irregularity.

*Figure* is the propriety of Bodies; which if they be artificial, the Artificer is the Cause of determining it according to his purpose, either by adding or taking away some particles or small Bodies; but if the compound Bodies are Natural, they obtain their Natural figure, which depends upon the figure of Atoms and Corpuscles. After the same manner water is round, because all the Atoms of which it is made are round.

The

The *Weight* of Bodies arises from Matter, that is, Atoms; for that Body in which there are Ten hundred thousand Millions of Atoms, is heavier than another in which there is not so great a number; provided the Vacuities are equal, or the Air it self being in their Pores be in an equal quantity: But if you take two Bodies of the same Magnitude and Extension, That precisely will be more heavy wherein more Atoms and lesser Vacuities are found; and consequentially the Other more light.

The *Motion* of compound Bodies proceeds from external Agents, driving them on with a greater or lesser force; and the easiness, or difficulty of the same motion proceeds from the figures of Atoms, and of all Bodies, and from the inclination which they receive from half emancipated Atoms which agitate all Bodies. So we see that round Bodies are more easily moved upon a plain, and again, those that are pointed, more easily enter into the Pores of others. But this pointed figure is sometimes occasioned by the Artificer, although not altogether from his hand; for it is confest that he cannot make an absolute perfect point out of a Matter whose Atoms are all of them round: From whence it appears, that

that the Figure and Position of Atoms doth very much contribute to this; but if a Body Naturally ends in a point, as fire does, it is because all the Atoms of which it consists, are all of that Figure.

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## CHAP. VI.

### *The difference between Natural and Artificial Compounds.*

**T**Hose who reject Atoms, and are the Asserters of substantial and accidental forms, imagine with themselves, that according to our Opinion there cannot be an essential difference assigned between Natural and Artificial Compound Bodies; because, say they, they both consist of the same Atoms, and are alike made from them three ways. (*viz.*) by Addition, Detraction, and Transposition; after the same manner as it comes to pass in the composition of Words, Sayings, and Discourses, which are made by a various addition, detraction, and transposition of Letters.

This is the very same Example which we have brought, nor do we desire any other; for from hence it is manifest, how  
from

from the same Letters, without the addition of any thing else, Words, and discourses essentially different are framed; And after the same manner, out of the same Atoms Nature formeth Compounds essentially different; so that there is no need at all either to admit or have recourse to either substantial or accidental forms, which are plainly useless in Nature.

We may here observe, and add further, That all Letters are not fit to Compose the Name of KING. By a parity of Reason, all Atoms are not fit to make Gold; so that all things are not made of all: But, as by the help of twenty four Letters we express a great number of different and contrary things; so, after the same manner, Nature out of the same Atoms Composes Mettalline Bodies, Plants, and Animals; by adding, taking away, and transposing of Atoms; yet not indifferently, but such and such Atoms, of such and such a figure, for all Atoms are not fit to enter into the composition of all kind of Bodies.

From hence is the First difference between Natural and Artificial Compounds, I mean from this addition of Atoms unknown to the Artificer, yet which Nature hath known rightly how to chuse;

so



so the Artificer makes an Arrow out of all-sorts of wood ; but Nature does not make this wood out of all kinds of Atoms.

Secondly, Artificial Compounds depend upon an intelligent Cause, which in its mind conceives an Idea and end of its operation ; whereas the works of Nature depend upon a necessary Cause, which operates without any Idea.

Thirdly, Art takes perfect and compound Bodies, and gathers them together, as a Builder collects and gathers the Materials out of which he frames a House ; whereas on the other hand, Nature first divides Bodies, and takes those Atoms which are left after dissolution, and fits them to the work it designed ; and out of them, by the addition of some others which it meets withal, and which are in state of freedom, it produces new Compound Bodies.

There is a difference therefore betwixt Mixtion and Composition, as there is betwixt the combination of Gold and Silver, and the generation of these Metals whether in the bowels of the Earth, or in Glass Vessels, where (if it be possible,) there is a transmutation of one thing into another : For this combination

tion does not in the least vary their Nature, and they are easily separated, which does not happen in things which Nature alone, helpt by Art, rightly and duly composeth.

## C H A P. VII.

### *Of Mettals and their Formation.*

**I**F those things which are above us are unknown to us, no less are those things also which are beneath us, and which happen in the shade and in the dark; and it may be truly said that the production of Mettals in the bottom of Mines, is the most obscure mystery in Nature; and without any manner of trifling, to speak like a Philosopher, all that can be said concerning this subject I reduce to the Cause producing Mettals, to the Matter from whence, and the Manner whereby they are produced.

The Principal Cause, Chief Agent, and Parent of all Mettals is the Sun, the Planets and fixt Stars concurring likewise to it: the Fixt Stars by their heat keep the Celestial Gold in fusion, and turn it round in the Cupel in the Centre of the World, that is the Sun; from whence

issue

*Issue from the Sun*

issue bright fumes without ceasing, out of which proceeds light, and which carry Heat, together with seminal Spirits, which penetrating the Pores of the Earth, generate Gold in the very Bowels of it: So Cœlestial Gold, that is the Sun, is the Parent of Terrestrial Gold, as it is of all other Mettals, by the reflection of its light upon each Planet, each of which, together with the Sun, produceth its particular Metall. And the Earth performs the Office of a Womb, which furnisheth the greatest part of the Matter out of which Mettals are produced, and nourisheth them afterwards: But the Sun bestows seminal Spirits all pure for Gold, but mixed with the Spirits of other Planets, for other Mettals.

But that this generation of Mettals may be rightly understood, we must call to mind that out of Letters Syllables are formed before Words, Words before Speeches, out of which all Discourses are compounded.

Nature does the same in the production of Mettals, for she begins with little Bodies, out of which she makes the three immediate Principles of Mettals, (to wit) Salt, Sulphur, and Mercury.

Of which, Salt is the grosser, Sulphur the more unctuous, and Mercury the

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more

more fluid and moveable part; and out of these three, by divers preparations, digestions, sublimations, and fixations, she makes a Mettalline or Mineral Body.

But it might be said, as it seems to me, that the Spirits or Corpuscles flowing from the Stars, purified in the Sun, and received into the Earth's Lap, are incrassated, and brought into clear and limpid Water; which Water is that viscous, sweet, and Mercurial Matter, which after some few Ages is elaborated and digested, till at last it becomes a yellow and fixt Earth, in which the Spirit and seed from above resides; which Spirit makes all the Corpuscles of water it meets withal like to the former, which piercing into the Veins of the Earth, and finding a Matter that is pure, encreases the Golden Mine, until it meets with dead Earth which hinders its propagation. But if the Mixture be impure, and strange Matter mingled in it, instead of Gold, it only produces Silver, Iron, or Copper, which are imperfect Mettals.

From this Doctrine I conclude first of all, That by Nature producing Mettals, ought to be understood this seminal Spirit consisting of Corpuscles flowing from the Fire of the Stars, and working these Miracles under the Earth. Secondly,

That

That Mettals enjoy a Mettalline Life, and after their way, a Vegetative also; that they are generated out of Mettallick Seed : Gold out of the seed of Gold. And that this Mettallick Embryo is nourished by the Air of the Stars, by the Spirit and Dew of the Heavens; that it grows, buds, and puts forth branches like a Tree, which Metallourgifts call a Mettalline Tree, furnished with boughs, Trunks, and Roots, which could never be, without a vital Principle included in it. Which things will more clearly appear, by what shall be said hereafter; and especially in the experiment about the Tree of *Diana*.

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## C H A P. VIII.

### *Of Gold, the King of Mettals.*

**T**Here are Seven Mettals, (*viz.*) Gold, Silver, Copper, Iron, Tin, Lead, and Quick-Silver; which Chymists call, *Sol, Luna, Venus, Jupiter, Saturn, and Mercury*; because they suppose each single Planet operates upon each Mettal; which is done as I told you by a remission of Cœlestial Spirits which are in the Solar Globe, and out of its Vortex are car-

ried into each Planet; who, according to the various opposition of the Sun, recieve more or less of his light, and send it towards the Earth, as being the womb in which pure, and impure Mettals are formed, according to the purity or impurity of the subterranean Lodgings.

First, Gold is the Chief and Noblest of all Mettals, it is the chiefest and principal work of Nature, and the heaviest of all Mettals; because the Metallick Corpuscles are so firmly shut and united together in it, that very small numbers of Vacuities are left in its composition; and in respect of bulk, there is a much greater quantity of Matter in Gold, than in other Mettals.

Notwithstanding this great solidity, and firmness of Gold, yet nevertheless there are some small Vacuities between its Atoms; for there is nothing absolutely solid and without a Vacuum, but an Atom in particular; besides Atoms, since they have Figures, cannot be united without leaving some empty spaces; for unless it were so, Gold could not be divided, no more than an indivisible Atom: There are therefore Vacuities betwixt the Atoms of Gold, though but very small, and also betwixt its Corpuscles,

cles, and lastly, between its little pieces.

From this well-grounded Principle, I discover the difference of the dissolutions or divisions of Gold. The least and grossest of them all is that which is made by melting it with other Mettals; when therefore it is melted with some, or with the least of the Seven; it is mixed with them, and divided into infinite Particles especially if it be mingl'd with a great quantity of an imperfect Mettal; as for Example, if an Ounce of Gold be melted into ten pounds or more of Lead or Copper; but the division of it is apparent from this, that not the least quantity of this mixture can be brought to the test, but some portion of Gold will be found in it.

Another separation is made in respect of the small masses of Gold, which is made by the help of *Aqua Regis*, which divides Gold after that manner, that it may as in the first Division be melted with any Mettal; so in this second, it becomes like the Water in which it is dissolved and divided: But since it is only separated into very small masses, it is easily again reduced into a Body, and to be melted with *Borax*, and fit to become the massy Gold it was before.

The third Division; which is called  
 L 3 radical,

radical, (although it be not so) is made by a proper dissolvent of the Philosophers, which is a Water clear, sweet, pure, and not at all Corrosive; fetch'd from the beams of the Sun and Moon; in which Gold is reduced into a clear and heavy Water, and is as easily melted as Ice in warm water; and then lastly, Gold cannot be said to be reduced to its first state, that is, body, unless this Water be turned into Earth, and this Earth be made fusile, fixt, tinging, and fit to elevate inferiour things, making poor people rich, and to make that perfect which was not actually so, although it was potentially.

I say this division is hardly radical, because it doth not proceed from a separation of its Atoms: For Gold is only brought into Water, and that is sufficient; for to bring it into Atoms were to destroy it, and it would be to no purpose; and this I think exceeds the power of all Natural Agents: For God only is capable of reducing Gold into its first Elements, and to cause it to be no longer Gold, either Natural, or Philosophical.

CHAR.



*Of the Nature of the Moon & of the Spirit of Silver*  
CHAP. IX.

*Of Silver, Copper, and other imperfect Mettals.*

Silver is a Mettal much less perfect than Gold, because its Atoms are endued with Figures scarcely so perfect, for there are mixt with it, particles reflected from the Body of the Moon, nor is that Mettal so heavy as Gold, by reason of Vacuities dispersed through it, which are both greater, and more numerous in it than in Gold; for which reason *Aqua-fortis* dissolves it without hurting the Gold.

It is true indeed, that *Aqua-Regis* dissolves Gold without touching Silver, but that ariseth from the different disposition of Vacuities in these two Mettals, and because the Vacuities of Silver are too vast for the subtile Spirit of *Aqua-Regis*, which passeth through them without division, and from the magnitude of these Vacuities in Silver, arises a greater sound from Silver, than is given from Gold.

For the same Cause, a greater and clearer sound arises from Copper, than from Silver, by reason (to wit) of its

greater Vacuities; into which, not a few Bodies of Air penetrate; which by their motion produce this sound. And for the same reason That is also lighter than Silver; for as much as Metallick Bodies are not so strictly bound together by reason of strange Corpuscles of impure Sulphur mixed with them, hence it is, that Copper is not so flexible or ductile as is Silver. They are both of them softened in Rust, because Silver has too little and Copper too great a quantity of Sulphur; wherefore they mutually temper each other, and the particles of each lose their acrimony.

III Silver may be made potable as well as Gold, and as potable Gold is the best Medicine in Diseases of the Heart; so potable Silver is a wonderful specifick in affects of the Head. These Medicines are potable, and extreamly profitable to Health, when they are dissolved the third way we spoke of, and are brought into water, by a sweet water, and a Friend to Nature, and which the Sun and Moon make use of as a Bath. As to Copper, from it is drawn a potent and innocent Sudorifick Extract, performing wonders in Chronick Diseases. The Spirits of these three, united by a fourth, make a most excellent Medicine.

CHAP

## C H A P. X.

*Of Lead, Tin, and Iron.*

**I**RON is heavier than Copper, because its Vacuities are not so great, and besides it is burthened with much strange Earth, the Corpuscles of which enter into its Composition: It is the only Mettal hard to be melted, because of this not mettalline Earth it possesseth also many Corpuscles of a dry and not fusible Sulphur, and very little of *Mercury*, (especially crude) which melts Mettals; so that to melt it there is required a body abounding with *Mercury*, such as is *Antimony*. But if it be mingled with a Sulphurous Body, it is brought into a red yellowish Saffron-colour'd Calx, out of which are made the powerfulest Medicines for obstructions of the Hypochondria. The Salt of it is sweeter than Sugar, and the Salt of *Antimony* is like it; nor is there in Nature above one Salt that exceeds it in vertue and eminency. These three Salts are the restorers of the radical moisture.

Tin is a Mettal abounding with much *Mercury*, much Salt, and but a little Sulphur; the Salt of it is the sweetest in Nature; *gummi* *resin* *grobuid* *has* *the*

224  
What additional matter is it? Oxygen - 400 C the  
Calx of Tin is formed by the addition of 10 imbedded Calx of Tin  
which is sufficient to be melted in the  
Matte of the metal (224) contains a  
great portion of the spirit of the  
the World: the Particles of these three  
substances leave many Vacuities in the  
mettalline Body, from whence ariseth  
its greater sound and lightness.

There are three wonderful things to  
be observed in Tin: The first of which  
appears in its calcination, in which we  
see the weight of this Metall encreased,  
although many Vapours rise up from it;  
and one would think that should much  
abate its gravity. This according to  
our Opinion arises from this, that the  
Pores of Tin are opened in calcination,  
that the compound is inverted, and a  
great many Atoms enter into them and  
fill them, and leave fewer Vacuities than  
there were before; and so upon that  
account there is more Matter or weight.

Another that I observe, is, That the  
Calx of Tin is very hard to be melted,  
and indeed so very hard it is, that the  
wished for end cannot be obtained, un-  
less you add a special Melter: But this  
difficulty arises from strange and immet-  
talick Particles which have parted the  
body of Tin, and have entred into its  
Pores, and hinder the re-union of the  
parts of this Metall in melting.

The third is, That Tin when it is  
mixed with other Mettals, calcines  
them, and hinders their refining; and  
on

*though true as to the composition, of the proper  
matter into which ( 225 ) present is deposited*

on the contrary, makes them Volatile:  
which ariseth from the irregularity of  
its composition; from its fixed Salt, inca-  
pable of being melted; from the subtilty  
of its Atoms, and the aptitude of its  
figures, arising from their easily being  
divided.

Lead as it is more sweet, so it is more  
sociable, it purifies and refines Gold and  
Silver from all impurities and foreign  
mixtures: It is the heaviest of all Met-  
tals but Gold and Quick-Silver, because  
there is a fewer number of Vacuities di-  
persed through it: After the same man-  
ner, and for the same reason, in calcina-  
tion it is increased as Tin is, and it is  
easily melted, because it abounds with a  
crude and indigested Mercury, which  
makes all Mettals fluid and fusible: It  
may be separated also from its terrestrial  
part, and from its very sweet Salt.

There are many things more worthy  
of note which I observe in Lead. The  
first of which is its weight, not much dif-  
fering from that of Gold, and arising  
from that, because this Mettal is in a  
manner almost altogether Quick-Silver;  
as also that the void intertities are filled  
with terrestrial and impure Matter, which  
hinders the fixity of the Quick-Silver;  
from whence an ill and imperfect coagulation  
pre-

precipitates it self; but he that can separate this Quick-Silver, and digest it by an agreeable Sulphur in a Vessel appropriated to this work, hath found a most excellent Remedy against most Diseases: For the aforesaid Cause this Metal is lighter than Quick-silver; and if Quick-silver be poured upon Leaden-Bullets laid at the bottom of a Pot, the Bullets will ascend, and swim upon the Quick-silver, as Ships upon the Sea.

X  
Boyle Another thing that I observe, are the various colours found in Lead, which are conspicuous only by an inversion of Atoms, and division of Bodies; as Black, White, Yellow, Red, and all the Colours of the Rain-bow.

A third thing, lastly, is the Salt of Lead (which the Chymists call *Saturn*,) which powerfully refrigerates, and is of great use against the too libidinous provocations of *Venus*, for it quite extinguisheth them. It is extracted by the help of Vinegar, from whence it becomes sweet, and loseth its acrimony; which happens only from the mixtion of the Atoms, as does the milky whiteness, which upon this occasion, the Vinegar is endowed with.

CHAR

## C H A P. XI.

*Of Quick Silver, and Arbor Dianæ,  
or Silver-Tree.*

**Q**UICK-Silver, the last, and, to appearance the most imperfect of all Mettals, because it neither endures the stroak of the Hammer, nor melting, nor indeed any other Tryal, is yet most perfect, because it is nearest to Gold, that is, to the most perfect Body; the Atoms of it are round, and in continual motion, they adhere so loosely together, that they may be separated with never so little Fire; and be sublimed into a Mass, of white or chrystalline Powder: It degenerates likewise into Poyson, by a sole inversion of it, and by being sublimed with an addition of Salts. It can also be reduced into its first State, if the Artist so pleaseth; and it may be truly called *Protheus*, every moment putting on a new shape, and receiving, and exhibiting various qualities, and colours, according to the diverse preparations which it undergoes.

There are three kinds of *Mercury* or Quick-Silver, there is (to wit) a Metalline, a Mineral, and lastly, a common Quick-

Quick-Silver ; the first of which is extracted out of Mettals, the second out of Minerals, and the third is the Vulgar Quick-Silver ; which last is also of three sorts, (*viz.*) either running, or sublimated, or precipitated ; the sublimated is again, either corrosive or sweet ; it is sweet (to wit) when the sublimated is mingled with running Quick-Silver ; for if these two are a second time sublimed, the corrosive becomes sweet, because the sharp points of the Sublimate are softned and blunted by the round particles of the crude Mercury, which destroys the sharp and sharp-pointed Atoms of the Sublimate. It is therefore needless to look for Physical qualities in the names of sweetness, or acrimony, since the only mutation of Atoms is sufficient to make that Matter sweet, which before was sharp, and sowre.

This Mettal is call'd Mercury and Quick-silver, because it is in perpetual motion ; so that it seems, as it were, to live : And to make manifest that there is in it a certain Internal, and hidden principle of Life, we need only examine what happens in the making of the Silver-Tree, or *Arbor Diana*, whose preparation is as followeth.

Take one Ounce of fine Silver, and  
pour



pour upon it in a Bolt-head, three Ounces of *Aqua Fortis*, and let these be left in hot Ashes, till the Silver be turned into Water, then take nine Ounces of *Quick-silver*, divide them into three parts, and put them into three Bolt-heads, or other Vessels; to which pour on first warm Water to the height of four Fingers, and then the solution of the Silver, taking care of each of the Vessels, and of the Matter contain'd in them; which afterwards let them stand all night in the Window, and, in the morning, in every Vessel you will see little Trees, rightly distinguished with a Trunk and Branches.

There seems here indeed a certain Principle of Seminal and Vegetative Life, since these Trees are shaped after the manner of Plants, although there is some difference: From whence it plainly appears, that Mettals have their Seeds likewise, and as well as all things else are generated out of Seed. But how this comes to pass I shall not now explain, because I shall speak of it elsewhere, in the generation of Plants; where I shall give an account of their coming out of the Earth, and of their growth. What is specially to be taken notice of, is, that these Trees are produced in one Night, which is never seen neither in Fruits,  
nor

for Corn. And all that can be said upon this occasion is, that from this very thing the motion of Atoms, and the various disposition of Corpuscles (which by their dissolution in so little a time form these Trees,) is best of all demonstrated. These Trees would without doubt bear their Fruit if we knew how to water them with a water of their own kind, and to transplant them into a Earth convenient for them.

## CH A P. XII.

### *Of Minerals.*

**M**inerals possess the next rank to Mettals: The first of which is *Antimony*, called the Lead of Philosophers, containing in it self an Arsenical Sulphur, which is Poyson by reason of the subtilty of its Corpuscles; by means of which it vellicates and corrodes the inward Membranes, as also producere Ulcers, after which follows a Gangreen, with a corruption and division of the Parts, as also of the whole Body, and then Death.

From hence it is that the scent or fumes of Antimony melting in a Crucible,

sible, and drawn in by the Nostrils, is deadly; for its sharp and rough Particles hurt the Brain by their continual motion and agitation: Yet notwithstanding the harmfulness of this fume, it conduceth not a little to correct places infected with the Plague, because one Venom fixeth another, and hinders its activity. Gold is purified by Antimony, for both being melted together, and the Antimony being evaporated by the Fire, the Gold remains most bright and most pure; Antimony carries along with it all the foreign Particles of the Gold, in as much as they adhere to the Atoms of Antimony; from this also is made a vomiting Wine, wonderfully purging the Body, yet not without some violence, by reason of its vellicating the inward Membranes.

The Mineral that next follows, is *Cinnabar*, compounded of Mercury and Sulphur, it is found in Gold-Mines, especially in *Hungary*, from whence it is brought to us; there is found in it some portion of Gold, but volatile and indigested; Mercury is separated from it by distillation, in a Retort, because the Mercurial Atoms do not closely adhere to the Sulphurous ones, and this Sulphur is foreign, crude, and not very well digested;

gested; but if the seminal Spirit could without hindrance have caused that the Sulphur should have been by degrees separated from the Mercury, and the Mercury digested by a central and Astral heat, Nature would have produced Gold out of it, but the impure Sulphur hinders the action of the seminal Spirit in that place where the *Cinnabar* is found, although below, or round about it Gold may be found ready made; having Branches like the Branches of Trees: There is an artificial *Cinnabar* also, made of Sulphur and common Mercury, from these mixed and sublimed we see a most beautiful red is made, by a sole inversion of the Atoms.

The third Mineral is *Emmery*, or the *Smiris-stone*, which is a *Marcasite* found in the Gold-Mines of *India*, from whence it is brought into *Spain*; out of it is extracted the best and purest Gold, whose Corpuscles were wrapt up in the Particles of a crude and unprofitable Earth: The same may be said of *Lapis Lazulus*, or the Azure-colour'd Stone.

*Litharge* and *Tutty* are not properly Minerals, because they are not digged out of Mines: For the first is only the grosser part of Gold, Silver, or Lead: But *Tutty* is the purer part of Copper,  
the

the Atoms of which, being set at liberty, ascend, and stick to the Arch of the Furnace wherein Copper is melted.

The fourth Mineral is *Virriol*, containing in it self Saline, Sulphurous, and Mercurial Corpuscles, all of a different figure. The Spirit which is distilled from it consists of Atoms so acute, as that they cut thick humours, and hinder vapours from ascending to the Brain: It penetrates likewise into imperfect Mettals.

*Arsenick* is a white and Chrystalline Mineral; there is a yellow one also called *Orpiment*, and a third, which is red, called *Sandover*; all these three are very violent Poisons, for the reasons above alledged.

Sulphur also is a Mineral, easily taking Fire, as being of a Fiery Nature; it dissolves and melts Iron, just as a burning Coal does Wax. There is extracted from it a Spirit, an Oyle, or Balsom performing wonders in Diseases of the Breast. There is also another Sulphur in perfect Mettals which is incombustible.

CHAP.

## C H A P. XIII.

*Of Salts.*

**S**ALT is the Principle of Savours, because the Saline Atoms have Figures fit to affect and vellicate the Organ of Taste, that is, the Tongue and Pallat; Sea, or common Salt is made out of Sea-water, by the help of evaporation; this very same Salt is dissolved in Water, a certain quantity of whose spaces it fills; all which being filled, the Salt falls to the bottom, unless something else be put into it, as Nitre, or the like, which the water carries with it over and above; from whence it appears, that the vacuities of water are not all equal, and that there are some of them which the Atoms of Nitre can enter into, but not the Atoms of common cubical Salt.

Common Salt, Vitriol, Nitre, and the like, have Atoms, not only sharp or pointed, but also like little hooks, adhering to Glass it self, though endued with few and very small Pores; and what is wonderful, Sea-Salt, or Vitriol, or Nitre, or all of them together dissolved in water, and the water evaporated

ted by degrees, the Salt or Salts we see ascend according to the heighth of the Glas, to the very brims of it, whither when it is come it descends on the other side, to the very bottom of the Glas, so that it is quite covered with Salt.

From this Experiment, three things are manifest: First, that there are little cavities in Glas. Secondly, that Salt like Ivy is endowed with little hooks. And Thirdly, that Salt grows, and creeps up according to the heighth of the Glas, just as the Sap of Trees, and nourishing humour ascends from the Roots to the Trunk, and from thence afterwards to the higher Branches, as shall be said elsewhere.

Husbandmen experience this to be true, when they burn their Stubble; that so the Rains falling upon the ashes, may carry along with them the Salt which is to penetrate into the Earth, from which afterwards Seed, and the fruitfulness of the Earth ariseth: Salt does also preserve Bodies from Corruption, by creeping into their Pores, and by that means hindring the Air from entring in, which would divide and dissolve their parts, or cause a fermentation in them.

There are a great many kinds of  
Salts,

Salts, (to wit) fowre and sweet, and acid, and bitter, and as many others as there are Tastes: Which ariseth only from a different disposition of their Atoms.

As Salt is found in all things, so from them it may be extracted; and they who extract Salt out of the Earth for the making of Nitre, do afterwards expose that Earth to the Air, where it is impregnated again with Salt, either from the Air or Rain.

Salts have as various motions as they have Figures, which appears in the evaporation of four Salts dissolved together in Water; for they do not only, after the water is evaporated, remain at the bottom, but also each of them chuseth to it self a proper place, and fastens it self to it, without mixing at all with the others, by reason of the irregularity of their Figures.

From the Salt of Urine is extracted a Spirit, which mixt with Spirit of Wine, composeth a Body hard enough, because those Spirits by filling each others Vacuities, are hardned; for nothing becomes hard but in as much as its vacuities are either filled or made less.

From Tartar a Salt is extracted, which is the Salt of Wine, out of which calcined,

*From Tartar a Salt is extracted, which is the Salt of Wine, out of which calcined,*



and fined, and dissolved in a cold place, is made an Oyle, which being mixed with Oyle of Vitriol, a great boyling ariseth, and that being over, a white powder falls to the bottom, called *Tartar Vitriolate*; for all the moisture of the Tartar enters into the vacuities of the Spirit of Vitriol, and the Salt of Tartar recovers its first state, that is, of a white Powder. But the strife betwixt them proceeds from the disagreeableness of their Atoms, by reason of which, they very much juttle one another. That Salt which is called *Sal. Polychrestum*, is not of less usefulness, because it drives out peccant Humours extreamly well. It is compounded, that is to say, of Nitre, and Sulphur: *D. Seignette* adds to it moreover another Salt, and indeed I must say, that that has succeeded better than all others; and that his *Sal Polychrestum* is a very innocent, and a most excellent Remedy.

CHAP.

## C H A P. XIV.

Of Subterraneous Fires, and Earth-  
Quakes.

**T**Here is no Man can doubt, but that there are Subterraneous Fires, the Mountains of *Hecla* in *Island*, *Aëna* in *Sicity*, and *Vesuvius* in the Kingdom of *Naples* are invincible arguments of them; as there are the Fires of the Stars above us, so there are Fires below us, called Subterranean, lighted beneath the Earth, from the beginning of the World; or at least, Bituminous and Sulphurous Matters were never wanting beneath the Earth, no more than Coals or Bituminous Stones, which easily take Fire, and Flame.

Therefore the setting them on fire was not at all difficult, for there needed only one little spark arising from the striking together of two Flints; or from a Lamp or Candle, which Miners carry along with them into the Pits, that so they may the better work there: The same also might happen by Lightning; or lastly, Fire might be kindled of its own accord, by a fat and unctuous humidity; after the same manner as wet

X If the heat of the Earth increases on Hay, its ardor is greater you descend into it & instead of the heat it is more

Hay, and such like Bodies, heat and take Fire.

From these Subterranean Fires, the heat of Mineral Waters ariseth; nor is there any fear that these should extinguish these Fires, for Bitumen burns in water, as the Experiment of Camphire teaches us.

Earth-quakes are produced by winds, that is by a troop of emancipated Atoms which shake the Earth; places most obnoxious to these, are the Sea-Coasts, by reason of Winds and Tempests creeping into the Bowels of the Earth, through the holes made hollow by the Water. But these Earth-quakes arise when the Earth recedes never so little from the Centre of its gravity, or is interrupted in its motion about the Centre of the Universe, that is, about the Sun; or else, when it is driven to and fro by the Solar Vortex, and this is a fourth motion of it, by means of which it is sometimes nearer the Sun in a streight and perpendicular Line, from whence sometimes happen intolerable Summer heats, or mild Winters, or on the contrary, as we may have experienced.

M

CHAP.

*a matter of wind & that is of  
Earthquakes or Volcanic eruptions  
happens...*

*the highest regions in nature & the air*

## C H A P. XV.

*Of Waters, and their differences.*

**T**HERE are many kinds of Waters seen, which I here propose to speak a little of: The first of them is that which is called the common Elementary Water, whose Atoms are round, and vacuities plenty, and triangular. This may be rarified, and condensed, as the Corpuscles of Fire entering into its Vacuities, either dilate them, and remove the parts of Water from one another; or the particles of cold compress them, and shut them up by their gravity, or else expel from thence the particles of Air, which had insinuated therein: Sometimes water is so closely shut up by Cold, that it is congealed, and brought into cones of Ice, from whose lightness appears the quantity of Air that has got into the Pores; and from its hardness is manifested that the vacuities of this Air are very much compressed.

Another Species of Water is that, which is called distilled Water, and which by the help of Alembicks, is extracted out of all kinds of Simples, which is thus done; the Particles of Water which

*See. Low-Hen upon the  
steps by the escape of the air after*

*See. Low-Hen upon the steps by the escape of the air after*

which are in Plants do free themselves, and are driven upwards in the form of Vapours; which striking against the Head of the Vessel are incrassated, crushed together, and condensed into little drops of Water, which fall down through the beack of the Alembick: After this manner Rains arise and fall upon the Earth; and from hence we may learn that *Vapours are nothing else but Water rarified*, and that in Nature there is a continual Circulation, whilst Water ascends, and descends; it ascends in the form of Vapours, and makes the Clouds; and it falls down again in Rains and Dew.

A Third sort of Water is called *Aqua-Fortis*, extracted out of Mettalline Salts, so that, to speak properly, it is not Water, but Spirits, that is, the most subtile and most acute Particles that are in the Salts, and by force are freed from them, and which forsaking their terrestrial parts, carry only the watery parts along with them, with which they compose a sensible and fluid Body. This Water dissolves Mettals, and brings them into a corrosive Liquor: So we may see what Saline Corpuscles are able to do when they are freed from their Earthy part, nor shall we any more

*M<sup>2</sup> wonder*  
 the earthy part of the salts is driven into  
 the higher regions in the air & so on

wonder at the effects which proceed from ferofities and falt Phlegm in humane Bodies : We may from hence also learn from whence the intolerable pains of the  
 X *Gout, Gripes, and the Cholick* do arife; for these are corrosive Spirits freed from their Earthy part, which become so sharp and penetrating, that they pierce through the parts on which they fall, pulling and tearing them asunder.

The following Species of Water is that which is called *Aqua-Vita*, which is nothing but the more subtile Corpuscles of Wine, which are of a Fiery and Sulphurous Nature, and do very easily burn, and take Fire, by the means of fermentation.

An *Aqua-Vita* is extracted out of all kinds of Grain, Pulse, and Plants : It is a wonderful thing truly, that we see a Linnen Cloth dipped in *Aqua-Vita*, and set on fire, and yet nevertheless it is not burnt, nay not so much as scorched : Which proceeds from this, That in *Aqua-Vita* there is a kind of Salt, whose Corpuscles sticking to the Linnen, defend it from the burning heat of the Flame, which applies it self to the Sulphur only; not being able to touch the Salt, or the Subject to which it adheres.

Under the fifth Species of Water are  
 com-

comprehended *Mineral Waters*, so called, because they contain in them a great many Mineral Spirits, as various as the places through which they pass, and as various as the Mettals and Minerals which they meet with in their passage: Amongst them some are hot and boyling, because they run through places in which Sulphur and Bitumen are heated: Of these there are a great many in *France*, but the most Natural and sweetest of them are the Waters of *Bourbon*, which conduce very much to the Breast and Stomach, and to the whole Body, by opening their Pores and vents, taking away by transpiration Head-achs, Rheumatisms, and Palsies; and they might deservedly be called an Universal Medicine, because besides the Vertues above described, they possess wonderful ones also in the Stone of the Kidneys, and curing Fits of the Mother; unless that they too much irritate Ulcers and inward Apostems, as also they discover them if they lie hid.

I have Chymically extracted out of these Waters a Salt as white as Snow, and altogether like to *Sāl Polychrestum*; and I can affirm that Nitre also and Sulphur are contained in them: For this Reason, their sharp Particles enrage inward Ulcers, and for the same Cause,

sharp-pointed Dock-Leaves being call into the Wells of *Bourbon*, the Salt hinders them from withering. After the same manner as the Salt of the *Aqua-Vita* keeps the lighted Handkerchief without being hurt, as we observed before.

There are also other hot Waters, which instead of Nitre are impregnated with Vitriol; whereupon they purge by Stool much more than the others, but they are not altogether so safe.

Of these there are many kinds, but all the *Bourbon* Waters are alike, except the Waters of *Jonas*, which are not to be reckon'd amongst the best. Moreover the Waters of *Bourbon-Lancius* in *Burgundy* are the hottest, and have some parts of Nitre and Sulphur, but the greatest part of Bittumen; wherefore they serve for Bathing indeed; but not at all for Drinking, because they purge only by transpiration, and plentiful Sweats.

There are also a great many cold Mineral Waters in *France*, and amongst the rest those of *Passy les Paris*, which besides that, they as well as others purge by Stool and Urine, they have this peculiar quality, that they cure Agues, and cool in Burning Feavers; they open inward  
and



and inveterate Apoftems, they open Obstructions of the Liver, Spleen, and Bowels, by the help of the Spirits or Corpuscles of Iron which they carry along with them out of the Mines through which they pass: Some of these are stronger, some sweeter, and lastly, some decayed.

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## C H A P. XVI.

*Of the Sea, its Ebbing, and Flowing, as also of the Saltness of Sea-Water.*

**T**HE Sea goes about the Earth like a Circle or Girdle, and the Earth is like an Island in the midst of it: But if by the Author of Nature cavities had not been digged in it, in which the Sea might be placed, it would overflow the whole Earth.

The first thing in the Sea that offers it self of Note, is the Saltness of its Waters, Originally produced from saline massy Bodies, produced at the beginning in the Earth, and melted by the help of the Waters, which from thence as now they are, were impregnated with Saltness. The heat of the

the water ... the Sea and the Sun make some  
Saline of the evaporated water of the water particles

Sun does not a little contribute to this  
saltiness, consuming its humidity and  
Phlegm, as do also the Salt which Rivers  
and Floods wash out of the Earth in  
their passage thither: From whence it  
appears, that it may be truly said, that  
all the Salt which is contained in the  
Earth, is carried into the Sea, and drawn  
out of the Earth by the help of Rivers,  
and Waters derived from them, and  
running through the Earth, whilst they  
are filtered to constitute Fountains of  
fresh Water. Now if we could filter Sea-  
Water after this manner, there would never  
be any scarcity of fresh-water in Ships, and  
long Voyages.

Another thing that I observe in the  
Sea, is the Ebbing and Flowing of its Wa-  
ters, in some places so very remarkable,  
and regular in their turns every six  
hours.

There are some who have thought  
that Rivers entering into the Sea on one  
part are the Cause of its flowing, but  
falling into it from another part, are the  
Causes of its Ebbing. Others have at-  
tributed this effect to winds, but the  
greatest part to the motion of the Moon,  
and to the condensation and rarefaction  
of the Lunar Air. This is the Opinion  
of Antonius à Reita, extant in his Book

This helps the ... the Sea Water ... the

X main round the Sun in a day  
not the Sea (247)

entitled *Oculus Enoch & Elie*, where  
he supposes that rarified Air presses  
the Sea, and lifts it up on both sides  
like Mountains, from whence there a-  
risseth its Flowing: Which Air being  
afterwards condensed, the Sea begins to  
subside, and the Waters to return to  
their first State, that is, they Ebb. He  
endeavours to build this Opinion, by  
this Argument, (to wit) that this mo-  
tion is most observable at the Full of the  
Moon, at which time the Air is very  
much rarified, and at the new of the  
Moon when it is very much condensed.

For my part I would rather say that the  
Ebbing and flowing of the Sea arisseth  
from the Earths motion from one Tro-  
pick to the other: For it cannot possi-  
bly in its diurnal motion move a degree  
forwards daily as it doth, without dri-  
ving the Waters from one part, and  
attracting them from the other.

According to this Opinion a reason  
may be given why its ebbing and flowing  
is only from South to North, and from  
North to South, and that they are  
lesser Between the Tropicks: Besides,  
there is nothing contained in this Opi-  
nion which is not very probable. But  
if there are some irregularities observed  
in ebbing and flowing, they arise from

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Islands,

Some in principle

Islands, Rocks, Straights, or Promontories, which very much hasten, retard, or lessen this motion; and partly upon this account, that is to say, by reason of the Straights of *Gibraltar*, there is no notable ebbing and flowing in the Mediterranean Sea; besides it is seated between the two Tropicks, and is neither too much Northerly, nor too much Southerly.

## C H A P. XVII.

### *Of Springs and Rivers.*

**T**Here are two kinds of Springs, (*viz.*) those that sometimes run, and those that run always; the first proceed from Rains, but these arise from the Sea: But to speak properly, the Sea is the source of all Springs, and Fountains; for Rains arise from Vapours raised out of the Sea by the help of the Sun, and then falling down by drops, out of which arise the first sort of Springs, which are not perpetual.

But perpetual Springs are derived from it more immediately, by the help of some subterraneous Watery Store-Houses,

Houses which are filled by aqueducts proceeding from the Sea.

It is commonly asked why Sea-water is salt, and yet Spring-water which comes from it is sweet? To which difficulty it is answered, the aqueducts rising out of the Sea run through subterraneous Sands, by which the Water in its passage is filtered, and deposits its Salt, or else the Salt is precipitated and falls to the bottom of these subterraneous Watery store-Houses, as we see in Salt-Pits, or after the mixing of Oyl of *Tartar* and Spirits of *Vitriol*; or that the Atoms pass through imperceptible aqueducts through which the saline Atoms cannot pass, by reason of their square Figures: So water is made fresh by the help of straining: Or lastly, by the means of distillation. So water being raised up in Vapours, and then condensed, distils into other receptacles which receive it, and send it to others, till it comes to the place where the Spring breaks out.

It seems a Wonder, that Springs arising out of the Sea should be able to ascend to the tops of Mountains. To which difficulty it may be answered, that the Water of the Sea is equally as high as the highest Mountain, because the

the Earth and Water make but one Globe, and the Mountains of the Earth do appear to us to be high and lofty, only in regard of the Plains and Vallies in which we are placed, and from whence we look upon them: But the Sea is higher than the Plains and Vallies, if you conceive it all Universally, because it makes a perfect Circle: And if a Line should be drawn encompassing the whole terraqueous Globe, it would be found a perfect circle, without any irregularity.

From this supposed principle it is evident, that Sea-water does not ascend, that it may find an exit out of the tops of Mountains, but that going out of them it descends, and produces Rivers in the middle of Plains, and bottom of Vallies.

And this They ought to mind, who have said that Water ascends out of the Sea to our Mountains, three ways, by which it is wont to be raised; (to wit) by the means of Pumps, Pipes, or woollen Cloth; so they say Sea-water may be drawn up to the height of Mountains, by help of the Beams of the Sun, and Stars; or by Channels or Pores unknown to us, and made in the shape of Pipes, and disposed of after the manner as we see all the Wine in the Vessel  
taken

taken out from thence by the help of a Pipe; or lastly, Sea water may insinuate it self into a spongy and light Earth, which imbibes it, and causeth it to ascend and flow; after the same manner as we see all the Water contained in a Bason, to ascend to the brims of it, and by degrees to go beyond, by the help of Cotten, or a little Woollen Cloth: As pleasant and as subtile soever as this fancy may be, I think my Opinion is better grounded, and more agreeable to truth.

By what hath been said, it is apparent hitherto, that Sea-water supplies Matter to Springs and Fountains; these do supply Matter to Rivulets, and Rivulets to Streams and Rivers, which empty themselves into the Sea; from whence they come out to moisten the Earth, and that, as I said before, by a continual fluid circulation.

It may be lastly asked, what may be the Cause of this circulation, and from whence proceeds that force, with which we see Floods and Rivers to run downwards? For to say that Water will seek after its proper Centre, is to flye back again to an Occult Cause, and to renounce our Principles. I conclude therefore, that the Atoms, Corpuscles, and drops of Water are of a perfect round Figure,

Figure, and since they have a certain inclination without hindrance nothing can keep them back, but that without interruption they do and will drive one another forward even to the World's End.

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## The Fourth Part of *Physick*.

*Of those things which are in Man, and of Man himself, as he is a Compound, Physical, Animated Body.*

**W**E are now come at length to our Fourth and last part of *Physick*, wherein according to what we proposed, we are to speak of the things which are in Man, whom now we consider as a Body animated: Which compels us to speak of the Soul, and of Life in general, and afterwards descending to special, we will explain the Life of Man as he is rational, and we shall endeavour by Natural Reasons to prove the immortality of his Soul.

CHAP.



## C H A P. I.

*Of Life in general.*

**L**ife, as we have said elsewhere, appears only by *action* and *motion*: So those Beings which have most of action and motion, obtain also most of Life: And we say a Man is *dying*, when there is but little motion left in him, and *dead*, when it is quite abolished.

Every motion is not a vital motion, for that it may be so, it must be Internal of the thing that acts, and proceed from a Principle that is not external: Wherefore the motion of a Stone that is thrown into the Air, is not a vital motion, because it comes from an external Cause; (to wit) from the hand of him that throws it. \*

I say further, that it must be the motion of a Compound Body, if it be a vital motion; and for this Cause, the motion of Atoms is not so, because they are simple and indivisible beings, neither capable of Life nor Death. And for as much as Atoms are not Compounds, tho' they compound Bodies; so they are not said to live in the least, although without their impression and ministry

there

\* But the Lord governs the heart  
which is unsearchable.

there is no Life, nor no motion in the Bodies we speak of.

*Life therefore is an action and motion of a Compound and Organical Body arising from an internal and seminal Principle:* And in this sense Metals may be said to possess a certain Kind of Life, since they obtain a certain motion of vegetation, by which they grow: and we may determine this motion to arise from an internal and seminal principle, though it be abstruse enough, and the Organs of Life scarcely appear; so that it is a very difficult matter to distinguish them in Plants, and in some Animals, as in the Fish called a Muscle, and in Oysters, which are nevertheless endowed with a more perfect life than Metals and Plants. We shall in the following Discourse tell you wherein this Life consists, and how Metals and Plants dye as well as other living Creatures.

There is a great difference between Life and the Principle of it, tho' not in like manner between Life and motion, or vital action. For Life is the action and motion of divers Beings gathered by Nature together, and united after such a manner, as that the parts of it move one another, as we see in

in Machines ; and what the Pullies and Springs are in these, the same are the Spirits in Natural Compound Bodies, that is, the most swiftly moving Atoms.

From this Doctrine is collected, first of all, That there are Atoms more swift, and fuller of Motion than others, by reason of their subtilty and figure, such as are Cœlestial, Fiery, and Luminous Atoms, to wit, such as Heaven, the Stars, Fire, Heat, and Light are compounded of: This we judge by the compound Bodies that are made and framed out of them: For humane Spirits instructed with material Senses, is not able to penetrate into the essence of Atoms, and their special difference. But we determine that the Atoms out of which Heaven, the Stars, and Light are made, have Figures, and activities greater, more perfect, and more fit for motion, than those that compound cold and heavy Bodies, although (when the thing is well considered) it may arise from their greater liberty, and more perfect Figure.

Secondly, according to our Principles, we must say, That the Vital Spirits so called, are nothing else but a certain number of Atoms free from all composition, and such whose Figure and condition

tion renders them unfit for service and slavery: This Doctrine supposeth that there are two sorts of Atoms in Nature, some of which like Common-People are destined to Imprisonment, Service, and Bonds; but others, like Nobles to liberty, and command over others: Now those whose Lot it is to be like the Commons, are made to compose the Machines of our Bodies, and they are such as entangle one another, and are linked and bound together in the formation of Bodies; whereas those which cannot be bound nor undergo Slavery, are destined to move the whole Machine of our Bodies, as not being fastned to any part, but running through all parts, and bestowing every where motion, sense, and disposition: These are what are called Vital Spirits, because they bestow Life, that is, motion: These Atoms therefore are not Life, but the Principles and Authors of it.

Sometimes Atoms that Compound Bodies get out of Service, and as often as occasion offers, and Bodies suffer division, are emancipated; for in all separations and corruptions of Bodies some Atoms do fly away, and like the first seek to recover Liberty; and when it happens that these Fugitive Atoms are mingled to-

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 together with those that are essentially free,  
 from thence arise conflicts in our Bo-  
 dies, and from These, Ill dispositions  
 and our Diseases, which there is no help  
 to be hoped for, nor any cure, unless  
 these rebellious and emancipated Atoms  
 are restored to their first confinement,  
 or else driven out of the Body, that so  
 by this means the Spirits may remain  
 pure and altogether free in their motion,  
 and not be interrupted by these irregu-  
 lar Atoms which are the common distur-  
 bers of Nature and Health. And for as  
 much as some Atoms continually flye out  
 of those Bodies which we use for nou-  
 rishment, by reason of divers degrees of  
 Corruption which they are forced to un-  
 dergo before they can be changed into our  
 substance: So it is certain that there is al-  
 ways in us some principle of a Disease to  
 be found, and that we never in this  
 World enjoy a perfect Health, and that  
 those are only most healthy who are  
 less sickly than others: As I have said  
 elsewhere, that there are no Men abso-  
 lutely wise, but that they that are called  
 wise, are less ignorant than others.  
 But moreover, if Captive Atoms are  
 sometimes free'd by emancipation, so  
 on the other hand, those which are not  
 used to be detained, are sometimes in-  
 carcerated.

*It seems less probable that the spirits are so easily  
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carcerated, and involved with others, nor can they stir beyond the limits of their Prison: And there are some which in like manner are so included with others by the Providence of the Creator, and necessity of Nature, and some only by accident, and the power and plenty of Matter encompassing them. So the Atoms shut up in the Heart, that they may give motion to it, and to the whole Body, were incarcerated at the beginning of its formation; or rather being cast into seminal Bands when God created it; afterwards they are translated out of this first Prison where they had little or no motion, into another, where they enjoy a more free and wandering motion, as shall be more fully discoursed of in the following Chapters.

The third thing that flows from this Principle, is, That these same Atoms are the Cause of Motion and Life, and that there is more of action, and more of Life, where these are in greater plenty and number; provided the Corporeal Machine be disposed to motion: For one of the principal Springs being broke, the vital Atoms lose their action, the greatest part of them exhale and withdraw themselves, and others wandering about, continue Vagabonds without any order or method.

So

So that it is necessary that the parts of a Compound Body should be disposed in some Order, which when wanting, the vital Atoms exert no motion; but this order of parts would be to no purpose, unless the vital Atoms were present to give them motion: The same thing we observe in a Clock, where an integrity and just disposition of the Wheels are required, together with the force of a Spring to set all the Wheels in motion.

Although there be a great proportion and likeness between living Natural Bodies, and these artificial Machines, yet nevertheless there is a great difference between them, for Atoms are Natural Springs, and exist Originally in the seed out of which the Body is produced, and they themselves are the Artificers of the Machines which give encrease to it, and dispose the Parts of it in such manner, that they may there exercise their motions, and this is that great Artifice of Nature, which operates by seeds produced from God, which exceeds all that ever Art can devise.

CHAP.

## C H A P. II.

*Of the Differences of Lives.*

**T**He difference of Lives are only known by the difference of Vital Actions, of which there are four kinds, (to wit) the Mettallick, Vegetative, Sensitive, and Rational.

Man the little World, enjoys a Life, under which all others are comprehended, and chiefly in him we observe a vegetative Life, as in Plants, and a sensitive as in Brutes; besides which two kinds of life, He possesseth a third of his own, which is a rational Life; He is nourished, that is, and grows like Plants, he is begotten of another, he is sensible as an Animal, and he speaketh and reasoneth as a Man; all these different operations which we see in Man, perswades us to consider him especially, and to begin with the life of Plants, which seems less considerable than the sensitive and rational, and which comprehends under it, their generation, growth, and nourishing, which three are equally conspicuous in Man as in Plants, though in a more noble and more eminent manner.

CHAP.



## C H A P. III.

*Of the Vegetative Life, common to  
Man and Plants.*

**T**He Life of Plants appears from their growth which supposeth Nutrition, and both these suppose a Birth, and this implies a Generation: For whatsoever grows in a vital manner, and by Nature is nourished; so likewise whatsoever is nourished, hath a birth, and every thing that is born, is begotten. We will therefore begin to speak of Man's generation, and of the first forming of him.

The Generation we here speak of, is the production of a thing out of Seed, under this generation are comprehended Conception and Birth, as Separation and Death are included in the Corruption of things. This is that which is not found in the Works of Nature, whose conception is made in the mind of the Artificer, and its Formation depends upon his hand, but all that is external to the work, which may be afterwards broken and divided; when in the mean time it cannot be said that we take away Life from it, or bring Death upon it. So that whatsoever is Begotten, to speak properly,

properly, Lives, and whatsoever lives, is produced out of Seed: Now Seeds are created from the beginning, and by the Author of Nature ingrafted into every Plant, and kind of Tree bearing fruitful Seed: So we see that there is a perpetual propagation and encrease of individuals in every Species in the Earth, as well as in the Waters and in the Air.

All and the only difficulty remains in explaining the Nature of this Seed, and the manner of its propagation. These two are Mysteries in Nature, which seem to surpass all humane reason: Nevertheless I will give you my meditations of them. And first of all, I suppose we may consider Seed in general, and as it is to be found, as we have said, in Metals, Plants, Animals, and Man. For after this manner being looked upon in general, it is nothing else but a *Medium* disposed by God to the propagation of these four several kinds in the World, so that one Substance as to its kind produces its like in the same kind; as Metal is produced from Metall, and a Plant from another Plant, &c. From whence appears the fanciful Folly of Chymists, who strive to multiply Mettals without a Mettallick Seed, and to produce Gold without its peculiar Seed: For the same thing

thing that in general Seed, is in respect of the four named generals; the same in special, is Seed in respect of the individuals which are produced of it.

For indeed to produce Plants, the Seed is only to be sought for in the vegetable Kingdom: So in like manner to produce Corn Seed is required, that is, a grain of Corn; to produce an Apple, there is need of the kernel of an Apple, or at least a Sien of it, which contains in it part of the Spirits and seminal Corpuscles, which insinuate themselves into the wild Stock of the Tree in which they are ingrafted or inoculated, and produce the same effect that a grain does which is thrown into Earth fit to receive it.

This is that vegetative Seed which we here speak of; and in this regard we consider Man, as he is partaker of the life of this Species, and begotten out of Seed. Nevertheless we are to distinguish the two substances in Man; (*viz.*) the material part, which is his Body; and his spiritual part, which is his Soul, Created by God, whereas the other is begotten. So that we here speak of Man onely, as he is a material Compound, without meddling with his Soul which is immortal.

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These things being supposed, I turn me to the two difficulties, which I have obliged my self to explain, and I design them a peculiar Chapter.

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## C H A P IV.

### *Of the Nature of Seeds, and of their Propagation.*

**T**He Learned *Fernelius* affirms that Seeds contain an Astral and Cœlestial Spirit, but *Galen*, that they contain something Divine. These great Wits have spoken most wisely, and have considered the seminal Spirit as a thing surpassing the Capacity of our Spirits; but what is much to be lamented, they have left us in admiration, and ignorance.

Therefore I try as well as I can to resolve these difficulties, that I may perform my promise.

First of all, therefore, since Matter is every where one and the same, nor does the Astral and Cœlestial differ from the Terrestrial, as we have said elsewhere, but only in this, that Atoms which make Cœlestial Bodies, have Figures different from them which compose terrestrial Bodies, and that the Particles of those

those are better and more strictly united than these : I say we must not conclude with *Fernelius*, that the Elements of the Stars are different from the Elements of the sublunary World ; nor with *Galen*, that that divine thing in the Seed, is a certain part of Divinity : But we must confess, that Seeds are Bodies composed of many parts, not only in respect of the sperm and diverse coverings in which the seminal Spirit is shut up and kept, but also in respect of the seminal Spirit it self, which is not a Simple thing, but a Body compounded of most subtile Atoms, excellently figured, made, and proportioned, that as an Original they may serve to the forming all Copies afterwards in the propagation of the Species. These are the Atoms, as I said, shut up, yet without Bonds or Servitude.

This Doctrine is agreeable to our Principles, and as we have compared Atoms with the first elements of Grammar, which are Letters; we say likewise, according to this Opinion, that Letters may be made and written so exactly, as to serve as a pattern to make others by: in like manner, among Atoms there are some so well made and formed, and disposed in so just an order, that they may

serve for Samples and Patterns to others; and in this manner I conceive of Seeds.

I come now to the next difficulty, which represents the multiplication of every individual, by a sole dilatation of Seeds: but the manner how this dilatation is made, is not easie to be explained; but I apprehend it after this manner.

A grain of Corn, which is a Seed, is thrown into the Earth, where it putrefies, and is dissolved by an acid menstruum which contains in it a Spirit, whose Atoms are partly of the same Nature with the Spirits of the Seed, or at least are subtil enough to penetrate into the vacuities of the husk of the Grain, and sperm in which the seminal Spirit is shut up, which Spirit (the coverings of it being dilated by these apertures) frees it self from the Prison wherein it was detained, and the Atoms and Original Corpuscles begin to drive on one another, they being themselves driven on by the Atoms of the acid or dissolving Spirit, which acted the first part in the Play, and received its motion from the others: *For whatsoever is moved, is moved by another,* and so successively the parts of the World, Particles, Corpuscles, and Atoms mutually drive on one another, and this motion began with the World  
and

and will continue 'till the end of it, when God will fix all things, and put a stop to all generations.

So that these seminal Spirits being thus loosed, and endowed with liberty by the acid Spirits, are still driven on by them, and being pressed, rise upwards, and form a stalk with a very slender top, by the concurrence of the Salt of the manure, and out of the corruption and division of dissolved Atoms of the neighbouring Bodies which they luckily meet withal, or which are thrown into the Earth near that place on purpose; this is what Husbandmen know very well, who for this reason Dung their grounds, and burn the stubble.

But if they knew how to steep their grains, or seeth Corn in an acid dissolvent; or water their grounds with it, there would be none found so barren, but would become fruitful, nor would the Husbandman be a little pleased with his plenty of Corn, and from thence the truth of our Principles and Experiments would be manifested.

Man, who is generated out of Humane Seed, and like Plants receives his first formation, does in this case very much excel them. For as in his dignity he excels all things that have material life, so

also he is begotten and conceived after a more Noble and more Eminent manner; and we may say with *Plato*, that a Man of all wonders is the most wonderful, not only in his perfect being, but also in his first Formation. This Formation is indeed a Miracle of Nature; which cannot be more naturally explained, than by saying, That the Womans Womb after having received the Man's Seed, is shut up by the Contraction of its Fibres, and the seminal body, finding there an acid juice, putrifies and is corrupted, in the space of Eight or Ten Days: The Seminal Spirit thus extricating it self, and joyning with the Blood that is there, and even now at the beginning being joyned to the Womans Seed, out of Two is made One, partaking in the Conception of Father and Mother, which is then afterwards formed by the help of this acid Blood which dissolves it, and is the Cause why these two seminal Spirits are joyned together, and out of two, compound One only Being, which is called *Embryo*.

The whole Wonder consists in this Ordination of Parts, which are disposed in so elegant an order, that there is no man in the World able to give them so just an order and disposition; and now, in the seed as in man of the great Designer behold farther work and more operate to the formation of



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see that the Blind beget Blind, and the  
Lame the Lame, unless the Mothers  
Blood supplies this defect.

I say therefore that in the resolution  
or dissolving of the seminal Body, there  
is necessarily caused a motion of Corpus-  
cles mutually driving one another to  
andfro, each possessing that place which  
gives them its Figure, by which they  
are detained in a due site, nor can they  
abide elsewhere. So the Corpuscles  
which form the Eyes, are of that Figure  
that they cannot be placed elsewhere,  
without a violent concussion of these mu-  
tually self impelling Atoms, and these  
concussions are sometimes the cause why  
when the Women are hurt, the Child  
is not at all formed, and that by reason  
of the sole inordinate motion of one  
Corpuscle, which either does not, or be-  
ing hindred by others which cause this  
motion, cannot find a place due to its  
Figure.

It is plain therefore that seminal Cor-  
puscles have the Figure of that part  
from whence they are derived, and the  
whole humane Body is no otherwise shut  
up in a small part of Matter, than an  
whole Oak in an Acorn, and an Apple  
in a Kernel.

The example brought by me above  
concerning

concerning the divers kinds of Salt dissolved in water, which in evaporating part asunder from each other, and each possesseth his place, not without a difference of Figures, will give some light to this my Doctrine.

## CHAP. V.

*Of Nutrition, which Plants and Brute Beasts have, common with Man.*

**N**utrition is a vital action, and so proper to Living Creatures, that as there is nothing nourished that is not Living, so there is no Living thing that is not nourished.

All the difficulty lies in the manner of Nutrition, for no Man doubts but Animals and Plants at the beginning of their existence are nourished, and grow, which could not be, without the addition of new Matter, which is changed into the substance of the thing Living.

This addition of Matter takes in, its attraction, preparation, digestion, and its distribution through all the Parts of the Body nourished.

These operations appear in Plants, wherein it is amiss to attribute that to

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Nutritive,

Nutritive, Attractive, Digestive, and Distributive Qualities, which may be explicated by the motion of the Atoms or seminal Corpuscles, contained in the Seed.

But because Nutrition is much more conspicuous in Living Creatures, and especially in Man, it will be necessary to explain the Reason how that is performed in him in the first State after Conception; and afterwards, when the Organs are formed: For there is need of Aliment, that the Organs which are just formed, and tenderer then, to be sufficient to undergo their Operations, may grow and be encreased. So that at the very moment he begins to live, there is a necessity that he should be nourished.

## CH A P. VI.

*How and with what Aliment an Embryo is nourished 'till the time of his Birth.*

**T**He first thing that is done after the laying together of the parts of the Embryo, and the disposition of its Organs, is, the infusion of the Rational Soul, which God in one and the same moment

moment Creates, and gives to this little Body as its Lodging, Forty, or sometimes more days after its Conception: what is done before the infusion of this Soul, to speak properly, is nothing else but a disposition of the Organs to receive it.

This admirable Structure begins from the Heart, Head, Bones, and other particular Fundamentals; and when it is already compleated, and the Soul infused, the seminal Atoms Presidents of the formation of the Body, persevere in performing their works, taking as Companions of their Office these Particles of the Mothers Blood which may serve to nourish the Infant, being sensibly solicitous for its increase, 'till the time of its Nativity. Yet nevertheless it is very difficult throughly to declare the true Reason of the Nutrition and Life of the Infant for seven or eight Months together.

*Gassendus* recounts three Opinions of the Antients concerning this thing, the first is of *Alcmaon* in *Plutarch*, affirming the Infant to be nourished by all parts of the Body, drawing in by the help of the Pores a necessary Aliment.

The second Opinion is by the same *Plutarch* attributed to *Democritus*, this Philosopher teaches, that the Infant is nourished

nourished in the Mothers Womb, in the same manner as it is nourished when born, to wit, by the Mouth, and this is the Cause he says why the newly born seek the Breast with open Mouth.

The third is *Aristotle's*, *Galen's*, and many others, who conclude that the Infant takes no nourishment in the Womb but by the Umbilical Veins, which taking their Original from the bottom of the Matrix, insinuate themselves into the middle of the *Abdomen* or Belly, where being collected into one Trunk, they lead on the Mothers Blood into the hollow part of the Liver, where part of it is carried into a Branch of *Vena-Cava*, and part into a Branch of the *Vena-Porta*, and the two Arteries which accompany the Umbilical Veins, having passed the Liver, each of them apart go to the two Branches of the Aorta or great Artery, and carry the Arterial Blood which they bring thither, that it may all be distributed through the whole Body of the Infant, and changed into a substance fit for its Nutrition.

This Opinion is confirmed by the refutation of the two former. For the first is false: For if the Infant was like a Sponge, it would not be nourished, but swelled, by the Water or serous humour in

in which it swims, and which is contained in the *Amnion*. The second Opinion is not probable: For the Infants head is placed betwixt both knees, nor can it suck the Caruncles, which are covered with a Skin, as is supposed, unless at one and the same time it should attract the water wherein it lies hid, or penetrate the Membrane in which it is involved.

The third Opinion standing firm, which I believe rests upon a better foundation, nor does the Infants Stomach generate Chyle, nor its Liver Blood, the Mothers Blood subministring all those things: And from hence it is, that a Woman with Child communicates to the fruit of her Womb the purity or impurity of her Blood, her good or ill nourishment, as also her Health and Diseases; and these Diseases are hereditary, not but that there are some which proceed from the Fathers, whose impure Blood, licentious living, ill nourishment, and frequent excesses afford matter to these evils.

Besides, we may say, that the Infant in the Mothers Womb does neither live nor breath, but by the Mouth, Heart, and Lungs of the Mother; from whence it comes to pass that the Infant for the most part follows the Mothers affections and inclinations; and seeing that in the  
state

state wherein it is in the Womb, it is tyed to its Mother in so strict a bond of Union, it is impossible that she alone should be feaverish, nor that the big-bellied Woman should dye, the Child remaining alive and healthful.

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## C H A P. VII.

*How Man is Nourished after he is Born.*

**A** Man Born hath need of Nourishment: now nothing can nourish him which hath not some Spirit of Life: So Roots, Plants, Corn, Pulse, Flesh, serve to the nourishing of a Man, and all this business is performed by the benefit of Atoms and vital Corpuscles passing from one Compound Body to another.

This Nutrition is necessary to encrease the substance of the born Infant, and so there is need of a new Compound Body to serve it for Aliment: And this Compound Body must of necessity perish and be destroyed, that so it may nourish the other Compound Body that is to be produced.

Such a Compound Body is Milk, being  
Blood.



Blood made white, and fit to nourish the Infant ; and the same Blood where-with the Infant was nourished in the Womb, being brought by the *Epigastrick* Veins to the *Mammillary's*, is there prepared, and by a sole inversion of the Atoms, or a different combination of the Corpuscles, this Blood is turned into Milk, which by the Childs Sucking being drawn into its Mouth, is received into the Stomach where the first digestion is perfected, and without any other Mystery, the Chyle becomes Milk by the sole inversion of Atoms, their site being changed : moreover, this Chyle brought by the branches of the *Vena-Porta* (according to the Antients Opinion) to the hollow part of the Liver, is converted into Blood, and becomes what it was just before ; this demonstrates the circulation of Compound Bodies, which are turned from one thing into another, the first Elements of things always remaining in their own Nature in such a number of mutations. Blood being in this manner prepared in the Liver, is carried from the greater Vessels into the lesser, and out of these it distils like Dew into the Parts of the Body, and is there converted into a substance homogeneous to the Parts that are nourished, and by this addition of substance  
the

*If the animal is nourished from the Stone  
and this increase ( 278 ) attributes the  
normal to —*

the Body is nourished, and encreaseth.

This addition differs much from that, by which Stones take their encrease; for this accretion proceeds rather from an external Agent, than from an internal Principle, and is almost totally performed in the superficies; whereas in Living Bodies, Animals, and Man especially, it is done by Internal Agents which make part of the Compound, and Universally extend themselves into all the inward parts which are nourished.

We must constitute also another kind of difference between the reason why Plants and Animals are encreased, and the manner how *stones and Metals* themselves take their increase. And in *Animals* indeed, three divers States are to be considered:

The first is of Augmentation, in which an Animal by Nutrition acquires more of substance than is dissipated, which happens in a Man from the time of his Nativity to the Age of two and twenty.

The second is a State of consistence, where the Animal by aliments acquires so much substance as it loses in taking pains, which happens to a Man from two and twenty to forty four.

The third is of decrease, wherein a Man loses and dissipates, more substance than he acquires by aliment, and this happens

*Q. many more in bulk in old age & less  
height & nutriment (272) the cause -*

happens to a Man from forty four to the  
sixty eighth year, and longer. *this is not a fault*

Aliment therefore is the support of  
Nature, without which it could not  
make up the losses which we suffer by the  
evaporation of the more subtile parts,  
or by a Consumption of the moist, or by  
an alteration, loss, and ablation of the  
solid parts: But besides that, this very  
thing discovers that continual loss which  
the substance of Living Bodies makes, by  
reason of the opposite motions of Atoms  
which mutually drive one another to and  
fro, some reciprocally moving others,  
and the more fixed those that are less  
fixed: It does also constitute a difference  
between this, and the Life of Mettals,  
which doubtlesly increase inwardly, and  
outwardly, by reason of an internal and  
external Principle, and new addition of  
substance: But some contingent loss  
or dissipation is not repaired by this Ad-  
dition, which we may see in Plants, and  
more distinctly in Animals.

The Life of Animals, which in some  
things they have common with Plants,  
doth yet differ from it in many circum-  
stances, which do not occur in Plants,  
for Plants have neither Bones nor Teeth  
to take and chew their Meat, but they  
take their aliment by sucking, without  
chewing,

chewing, by which very thing the first digestion and resolution of aliments is performed.

X Hunger and Thirst precede this chewing, which does not appear in Plants. Hunger is the desire of a solid, and Thirst of a moist Body. Sharp-pointed Atoms move Hunger, and the Corpuscles of the acid Liquor which velicates the tunicles of the Stomach. Thirst hath its beginning from the drying up of this acid Liquor, its moisture being consumed by the heat of the Liver, or by violent Labour, by reason of this dryness the Orifice of the Stomach wrinkles it self up, and the parts of the Jaws, Palate, and Tongue perceive pain and pricking; to which it requires no other Remedy but Liquor, when the Atoms fill the wrinkles and fissures proceeding from the evaporations of the humid parts,

Y It appears/and may be by the  
Growth Case being a consequence CHAP.  
of what in man & animals is hunger &  
Thirst; with which earth & water & plants  
would die -

## C H A P. VIII.

*The Sensitive Life in Man, and other Animals.*

**M**AN would not be in the number of Animals, if he did not enjoy a Life of sense as well as other Animals, but he is an intelligent and rationable Animal, and by a special priviledge bears the Image of his Author.

He possesseth a Spiritual and immortal Soul, than which there is no other substantial form in the World, and consequently, only Man is compounded of Matter and Form. So that all those substantial Forms which go by the name of vegetative Souls in Plants, and in Brutes by the name of sensitive Souls, are nothing else but vain illusions, since Atoms and Corpuscles are the internal Principles of all the sensitive operations which we distinguish in Living Creatures.

Five of these operations are thus numbered, (*viz.*) *Seeing, Hearing, Smelling, Tasting, and Touching.* To these we may add respiration in all Animals, or the greatest part of them, and Speech specially in Man.

These operations are not made after the

11 man has not been accurately examined in  
his natural or wild state (282)

the same manner in all Animals, for Man the noblest of them all, is neither sharper sighted, nor quicker of hearing than the rest: And in the same respect the other Senses are much more perfect in other Animals than in Man. The *Lynx* is sharper-sighted, the *Hare* hears more distinctly, the *Dog* smells better, the *Ape* enjoys a more exquisite taste, and the *Spider* a more delicate touch: For all these kind of Operations are purely Natural and Animal, and do not depend upon the Will or Reason, but upon the sole disposition of Atoms, and the construction of the Organical Parts.

## CH A P. IX.

*Of Sight, its Organ and Object, (viz.)  
Light.*

**S**IGHT is the chiefest and most noble of all the Senses, whether we consider its Organ and Object, or the operation of it by it self, and the necessity of it. The Eye is the Organ of Sense, its object is a coloured and lucid Body, for without colour and light there can be no seeing.

The Eye is made up of three tunicles,  
(viz.)

(viz.) the Horn-like, the Grape-like, and the Net-like: This last is in the bottom of the Eye; the Grape-like Tunicle has a perforation called Prunella, and the horn-like is the outward covering of the Eye, some part of which we call the white of the Eye.

The Eye enjoys likewise three transparent humors, (viz.) the Watery, ChrySTALLINE, and Glassy: the Optick nerve, rooted in the Brain, and applying it self to the bottom of the Eye, brings hither the Spirits or visual Corpuscles woven together out of a luminous substance. The particulars belonging to the composition of the Eye Anatomy will teach: Let us speak something of the Object of Sight, and first of Colour.

Colour which Bodies exhibit to us, is nothing else but light reflected and interrupted by the Angles of the Atoms, and the very small Cavities in the extremities of Bodies, as also a diverse reflection and refraction of that Light, upon which the variety of Colours depends.

Experience favours this Doctrine, for Galls being broke and thrown into artificial or Natural Vitriolated-Water, give a black colour like Ink; and hereby is known whether Waters contain any thing of Vitriol, Iron, or Copper: For  
Mineral

Mineral-Waters when they pass through an Iron Mine by an addition of Galls grow black, but others not ; and this blackness is not any Physical and accidental quality produced in Water by the throwing in of Galls which are not black; but this change arises only from a new position of Atoms and Corpuscles, where-  
 // by the Rays of Light are bended and broken after a new manner.

The same thing happens if you mix *Minium* which is red in its own Nature, with Wine-Vinegar, for that will turn white; and the yolk of an Egg mixt with Turpentine looks altogether like a white kind of Cream. Now in all these and other Experiments nothing happens besides a perturbation of Atoms  
 // which take a new place, and reflect or refract Light after another manner, without any production of any new Accident.

Nor is Light any accident or Physical Quality, as the Disciples of *Aristotle* will have it, but a real effusion and spreading of Corpuscles, which flow from the substance of the Sun and upper Stars, and more or less penetrate through the empty spaces of the Air, as the Air is more rarified, or more condensed.

It will be convenient to remember  
 here,



here, that we place the Sun in the Centre of the World, and say that the Sun is of one and the same substance with Gold, Gold melted and purified, and that its glittering and rayes is properly that which we call Light, and which is reflected upon all the Bodies of Planets, amongst which, the Earth only is supposed habitable; these Sun-Beams are nothing else than that which we call Light, so Light is a certain thing compounded of the Atoms of Gold, by a mutual connection amongst themselves bound together, and which tye all the parts of the World to their Centre the Sun. From whence it is easily gathered, how all things act by vertue of the Sun, and that the Sun it self also is an helper that Man be produced from Man.

The truth of this our Doctrine appears from those things which we brought from Monsieur *Bezancon's* Experiment. Light therefore is of the same Nature with Gold and the Sun, and is therefore Gold, or the Sun rarified, and Air in the day-time is full of this dispersed Gold; so that in breathing we draw in some Atoms of this rarified Gold, which brings Life to us, in bringing to us the Principle of Natural Heat, and radical moisture.

No wonder that *Aurum Potabile* is of so great esteem, and sought for by every illustrious personage to restore Health: But since true *Aurum Potabile* is scarce, by reason of the defect of a solvent, and of a Natural and Radical Vehicle, God provides for this, by giving us Light, which we take in by the Air, which serves instead of a Vehicle to it. Light therefore is our Life, and preserves it; and we say of a Man that is dead, that *his Light is extinguished*, and of a Man that lies confined in a Dungeon, that he dwells amongst the Dead.

Upon the occasion of this Sentence which I have thought fit to confirm, I observe that Light is the Universal Spirit of the vulgar, varying according to the Subject it meets withal; and that the same is that famous dissolvent from which only, or by the addition of common Gold, may be made the Universal Medicine. But for as much as to the obtaining this effect there is required that this Light be made liquid, and out of it be made a living Water, and Stream, or Rain of Gold, which few can perform: From hence it is that few possess this supreme Remedy.

I observe, Secondly, that Light excites the seminal Spirit, which is of the same

same Nature, and is *containe d* under divers Seeds, and divers coverings, and that the same light produces in us and reproduces those Spirits which are called Vital and Animal, and which are nothing else than Luminous Corpuscles which are always in motion, whilst they take Air, and together with the Air, the Light annexed, without which their motion ceaseth. We see also that a Man dyes for want of Air, and by the hindrance of respiration; and these Spirits are more dulled by Night than by Day, and so do partly fail in the Body, the Light failing: And unless there did still continue some Luminous and Solar Spirit in the Air, or if the Stars did not afford a sufficient quantity of it in the Night, in the Night it were impossible we should be able to escape Death.

Besides we may observe that by this Light, which *penetrates* and creeps through the Bowels of the Earth, Mettals are produced, for it is their Seed lying invisibly hid in their Bodies: We may say likewise, that every Living thing receives Life from this Light, so that we live by Gold only, we subsist by the benefit of Gold, and all things are filled with Gold, that is, with the Sun rarified, and expanded through all things, through all the most secret places, and through our very  
 O Hearts,

Hearts, whose motions will cease when the Light of the Sun and other Stars shall cease; whose motion will likewise cease at the end of all Ages.

By the help of this Doctrine we understand what the Antients meant, when they said *all was full of Jupiter and Gold, and that the Commerce of Heaven and Earth was bound together with a Golden Chain: That the Universal Medicine cannot be extracted but out of the water of the Beams of the Sun and Moon.* By this means also we comprehend the truth of the saying about *Apollo* and his Golden hairs, and we shall know that which the Philosophy of the Antients could not explain, to wit, from whence the motion of the Spirits in our Bodies proceed, and in what the Life which we enjoy does properly consist: And so even the new Philosophy will no less Labour in explaining the Essence of Life, unless it follows these our Principles.

As many as shall have been sufficiently illustrated by this Light, will here find a Secret for the Nobility, by which for many years they will be able to preserve Health and Vigor beyond the ordinary term. I say enough of this thing to move Illustrious Wits, as being enlightned People, to enquire into the Nature and Effects

Effects of the Light and Colours which we see, which the Sun produceth in the Rainbow, and in the Peacocks Tail, where, by the help of a Microscope a thousand Golden threeds are seen.

Nor is there any reason why we should stand amazed at the sight of these Colours, since they are nothing else, than Light reflected and refracted, wherein all Colours are contained, as I have said; for it is of the same Nature with Gold, out of which all Colours may be produced, although the yellow only is apparent. They who have divers ways dissolved Gold, and Mercury, or crude Gold, have there found all of them as many Colours as ever they had seen, and many more Colours than they knew. //

## C H A P. X.

### *How Illustrated Objects are seen.*

**A**RISTOTLE and his Scholars will have Vision to be made by certain Qualities commonly called the *Intentional Species*, which, as is reported, joyn the visive power, that is the Eye, with the Visible Object, and the Powers represent the Object. These Species according to this Opinion are discernable, and are in the Air as in their proper sub-

ject :  
*all round the sun<sup>2</sup> object alike  
 under the same angle & distance*

ject: but this is not to be endured, for if these are accidents, and have Air for their Subject, the Air being changed by the least breath of wind, the accident would pass from one Subject to another, which is refractory to the Principles of these Philosophers. These species bring in a great many other difficulties, which relate to their Nature, Production, Propagation in the Air, Education, Extension, and Reception into the Eye; all which cannot be solved without captious contentions, and when all shall be thoroughly canvased, no body will be e're the wiser, from whence it happens, that *all these accidents* which are neither Bodies nor Spirits, I am forced to send back to *School* with their *Doctors*.

Some believe Vision is made by an emission of visual Rayes out of the Eyes; but neither will this Opinion subsist, in as much as it supposes, that to see an Object ten Leagues distant from us, it is of necessity that the Eye should send Corpuscles thither, and even to the very Heavens, to see the Stars there.

*Gassendus* would have vision made by the Species or Figure of the Object, composed of Corpuscles or most subtile Atoms proceeding from the Object, and received by the Eye: But it cannot be con-

ceived,

*X The mind represents the  
object by the eye. Hence it  
sees it when it is not there.*



wherein is contained every kind of divers Colours, as it is determined upon the Objects by the angles of the Atoms, does also comprehend all kind of Objects too, and represents them with all variety of Colours, according to the divers determination of the Objects: Or to say more truly, that Light represents it self to the Eye, as it is determined by Objects, and it is certain we see nothing but Light, and Colour, that is Light with its determination; and when we distinctly see an Object, its extention and Figure, that proceeds from nothing else than that we see Light determined by the dimensions and circumstances of the Object.

The Nature of Light therefore is solely to be considered, and it will no ways hinder, but that we shall avoid all the difficulties of the others, by embracing an Opinion which rests upon truth, which very well, and with the consent of all, conceives *that Light is seen by it self*, nor is there need of any Species to see Light; and since we, to speak properly, do not see the Objects, but Light the Object of Sight, there is no necessity, that the Object should transmit Accidents or Corpuscles, as if Light could not be seen of it self.

From this Doctrine, that which appears new, follows, that Light is to be  
confi-



considered in a threefold State ; and first of all in the Quality of the Object ; secondly, in the Quality of the Term.

The first state is Light, determined by the Object, the second is Light expanded in the air, the third is Light received by the Eye, and represented with all its determinations. And this is it which we call the Image of the Object in the Eye, as it were in a Glass.

In prosecuting this subject, we might have treated of the reason why we see Objects by the help of perspective Glasses multiplying their Figure ; or by Microscopes, a new invention, by the help of which many things are discovered which before lay hid, such as are Worms in Wine Vinegar, Gnats in Water and Dew, as also, Pores in Glass, and a thousand little Animals in Seeds. But of these I shall say nothing now, since I have done it already in a little peculiar Tract, which I will Print the first opportunity, where the application of the Principles of my Physick will be seen to explicate more illustrious things which are discovered by the help of Microscopes, if the Reader pleases to spend his time to see and judge of what I say concerning these things.

## C H A P. XI.

*Of Hearing, its Organ, and Object.*

**T**He Organ of Hearing is the Ear, composed of a Cartilage and hollowness's, wherein the air insinuating it self by its motion causeth sound. Besides these external and apparent Particles, there are others also internal, which are composed of Membranes, as also some little Bones and included air, the auditory Nerve doth also run down thither, that it may bring the Animal Spirit, necessary to all the Operations of the Senses.

The Object of Hearing is Sound, to wit, the motion of two or more Bodies mutually meeting one another ; and as no Body that wants Heat and Light is the Object of Sight, so no Body that wants motion can be the Object of Hearing : Or rather, as Light alone, without the intervention of any other Medium, is the Object of Sight, so is motion the Object of Hearing, so that there is no necessity to have recourse to the pretended Quality which is commonly called Sound ; nor to any *intentional Species*, no, nor so much indeed as to Corpuscles sent out a great way off. I

I say therefore, that as Light is seen by it self, and Truth immediately and without any other intermedium is known by it self, so Motion is apparent of it self, without the pretended Qualities of *Aristotle*, or Corpuscles of *Gassendus*, except those of the Air, which are in motion: For they being wanting or stirred up by an opposite motion, little or very little is observed of it. The motion therefore of Bodies, is the Object of Sounds, but there is a necessity for a fluid Body to be present, that it may be violently moved to and fro, which happens in irregular Sounds, or with Method and Measure; as in Musick, and the use of Instruments. This Fluid Body is sometimes intercepted by two Solid Bodies, and is forced to go back with violent motion.

## C H A P. XII.

*Particular Questions concerning Hearing.*

**T**He first Question is concerning the Penetration of Sounds, and it is asked, How it comes to pass that a Sound constant in Motion can more easily penetrate through a thick Wall, than through Glass or Water?

I answer, that the thickest Walls have great Cavities, into which the Air insinuates it self, or lies shut up in them whilst they are Building: After which manner without doubt it is shut up in Guns made of melted Brass, which is the cause that when they are tryed, they sometimes burst asunder, which hapned about two Months ago at *Niverina* in a Field near *St. Germans*. Air therefore is more easily shut up within Walls whilst they are Building, than in Guns whilst they are casting: And this included Air, receives its motion from the external Air, and communicates the same with that which is found in the Breech or adverse part of the Gun. Which thing does not happen in Glasses, which have but very small pores, into which the External

ternal Air cannot enter, only Light and the most subtile Air enjoying this privilege.

From hence it follows, that Bodies which have none, or but very small Vacuities, and contain no Air, or but very little, are more sordid, and less resounding, as Gold, and Lead, however Lead is more sordid than Gold, although it hath more frequent vacuities, but they are less regular; for since it is endowed with more Pores than Gold, it ought to give a greater sound than Gold. For to the making a sound, it is not sufficient that the Body contains Air, but that the Air be so bound up that it cannot find a way out: and as to the sound of Bells, that depends upon the Air intercepted between the Clapper and the Bell, and wandering round the compass of the Bell, before it can get out, and drive on other Air, yet so, as that it presupposes Air shut up in the Pores of the Mettal. //

The second Question regards the propagation of Sound; or the sound of Bells and Guns are heard a great way off: But the reason of this is not difficult to be given; for the Air violently driven on, because it is easily moved, gives a sound according to its motion, greater, or lesser, and because the motion  
of

of Air is not momentaneous, so the sound likewise is not in a moment brought to the Ears. Certainly the Air that is impelled, drives on other Air on every side, until that circular motion ceaseth, as we see // when a stone is thrown into a *Pool* the water is moved in circles: This motion in respect of Sight is not in the Air, we see the stroak ere we perceive the sound, for Light is determined in a moment; nor does a contrary wind hinder Light as it doth sound; for Light does not depend upon the motion of the Air, and the Light of the Air is fixed, in the same manner as the Centre of the World, from whence it draws its Origine, to which it is firmly and immoveably annexed, at least that it be not condensed and grow thick.

The third Question regards the repetition of Sound, and is called Eccho; and it is nothing else than a repercussed and reflected motion of the Air by hard Bodies, or retained and renewed by other Air shut up in the Cavities of Bodies, and if there are many Cavities in a streight Line, there are made many reflections, and the Eccho is multiplied, and that more or less distinctly, as the reflections are more or less perfect, and the Ear more or less distant from the an-

*If this seems not to hold in speaking as gle we hear the word before the air can have made a reflection*

gle of reflection, which is always formed right forwards, and is streight, unless there be some hindrance, and hath always a certain and determined Distance.

Fourthly, it is asked how it comes to pass that the strings of two Harps Tuned alike, although they be distant two or three paces from one another, the one being struck, the other will give a sound? I answer, that the air of one being struck into motion, does by its motion excite the motion of the other, which is constituted in the same state, or tuned alike. For here to alledge Sympathy, would be nothing else but to flye to the Sanctuary of Ignorance. *This is a species of sympathy, as the whole*

Fifthly, It is asked, Why some sounds are sweet and very pleasant, and others on the other hand harsh and displeasing? It is answered, that this proceeds from a diverse motion, and from the ruggedness and smoothness of Bodies, as also from the smiteing of the Air that is driven to and fro. *is a transference of motion*

Sixthly, it may be enquired from whence the noise in the Ears proceed? and it is answered, that this inconvenience proceeds from a motion of the interior Air, against Nature, which sometimes happens from the breaking in of foreign Corpuscles, or from the solution and

and emancipation of some Atoms, or from the Pulse of the Arteries, or motion of Vapours, which striking against the Drum of the Ear, make that humming noise of the Ears.

Lastly, it is asked why some People hear better than others? and we may answer, that this proceeds from the impurity of the interior Air: For not to say any thing of those that are born deaf, or have their Organs ill formed, or have no interior or included Air; or of Old Men, in whom this Air is dissipated, or of those whom a kind of thick humor falling upon the Organ after a long Disease makes Deaf; or who are wounded, or have an Imposthume in their Ears, I say that those who have most of this interior and purer Air, have their Ears more accurate, and their Hearing more distinct, if withal the Auditory Nerve be well Composed.

### C H A P. XIII.

*Of Smelling, its Organ, and Object.*

**S**MELLING is an action by which we perceive and distinguish Smells; the external Organ is the Nostrils, the internal

*decey? Quatane or destry? tan up 6*



internal are some glandulous and spongy parts like Teats, which descend from the Brain to the Nostrils, or the Olfactory Nerve; or Odours which affect the Spirits contained in the Nerve, and move them; and these Spirits being moved and stirred up, carry the sense of the Odor to the common sense.

The Object of Smell are Odours, in quality not distinct from Bodies, but are rather Atoms or sulphurous Particles going out of Bodies, their Figure is hooked and adhering; from whence it comes to pass that they adhere like Oyle or fatness; and are preserved a long time in Chests among Cloaths, especially Woollen ones. And therefore contagious Particles lye hid for many Years in Ward-Robes; and they who frequently Visit those that are Sick of the Plague, do not use Woollen Garments, but Linnen ones, to which the contagious Particles do less adhere.

From this Doctrine it appears, that Smells are little Bodies which issue out of all Compound Natural Bodies, especially Living ones; by reason of their frequent agitation; and which have Pores more open than Bodies not animated.

Besides, it appears that these Cor-  
puscles

*As small bodies would thus pass into the  
Scent could have been removed*

puscles do never go out of Bodies in greater number, than when they are dissolving; after which manner, a smell exhales out of Gold and Silver dissolved, excelling that of Musk and Amber. From Antimony dissolved, an Oyle is drawn of a very grateful smell, and by another way a Sulphur is drawn out, not to be endured for its stink.

And by the help of these Odoriferous Corpuscles Dogs Hunt Hares, and find out their forms, and by this means they discover their Masters foot-steps: It is an argument that this is done by the help of these Corpuscles, because they are dissipated by Wind, and hindered by Dew, and Experience teaches that those that handle Musk, carry the smell of it a long while about them: From whence it is known that these very small Bodies are adhering, and that they have hooked Figures, and that they do please and tickle according to that proportion which they have with the Organs.

*He impugnethe the air as  
alter of lecture & then let it be carried  
the down*

CHAP.

*Of Taste, and its Object.*

unusual experience. Man will take notice of speed and force & be pleased to see it.  
But the least sensible pleasure is in it to be thus impressed on —

unimpaired expression. In an unaltered portion of *Sparganium angustifolium* I observed  
but the least such a plant is not to be thus improved on —

unimportant experiments  
but the least, in this

plants - I don't ask for change  
by discriminate equally - may be

change the Natural Savour of things, as Wine, by the addition of Water, loseth both its strength and Savour, although in this condition it is more grateful to some, than when pure Wine.

From whence we know that the diversity of Tasts does not proceed from the sole diversity of Savours, but also from the diversity of the Organs; and hence it is, that all people do not relish alike one and the same thing; nor have all People a Tast equally delicate, from whence it comes that some are delighted with those Meats that others abhor.

The Organ also is sometimes so ill disposed, and the Tongue burdned with so great a quantity of ill Humours, that things of the most grateful Savour seem insipid, as also things not very sweet seem bitter; which thing happens in a double and a continual Tertian Ague, by reason of the dominion of Choler.

CHAP.

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that Cold does not penetrate into the Body but with pain and torment, as also it excites a frequent motion of the Parts, or shivering. Besides there are not wanting some Particles so gross as to stop up the Pores of the Body, and to drive the Heat into the inward parts, which we call *Antiperistasis*, by reason of which the included Heat becomes stronger, which is the Cause why the Heat of the Stomach in Winter time is greater than it is in Summer, and why Wells are warm and reek like Smoak. For the same Reason, Heat being shut up in our Bodies by the external Cold, sometimes such like fumes are raised up in the Brain, which are not without a great deal of danger.

Feeling is several ways performed, and first of all by application, where Body is moved to Body, and Hand to Hand, by penetration, in making a solution of that which was whole; as a Needle pricking the Hand.

Secondly, Feeling is made by separation, one Body coming out of another, which if occasioned by Nature, is always accompanied with pain, as in non-Natural ejections.

Thirdly, this Sense appears in the motion of those Bodies which are con-

*Ant-prov that pressing is only a pain & is tained  
But the force of the heat & not the cold, which is*

ained by others; for sometimes they move themselves with so great force, and do so press, rend, and tear, that they excite pains not to be endured, as in violent Head-aches, the Pleurisie, and pains of the Gout and Cholick.

## C H A P. XVI.

### *Of the Speech, Pulse, and Breathing of Man.*

**V**OICE is common to all perfect Animals as well as Men, but so is not Speech, or an articulate Voice. Brutes express their sense of things by Natural Voices: and Men their interior Speech, to wit, Thoughts, by outward Speech as its Interpreter: And this is done by the motion of the Tongue, as also of the Air after a certain manner driven to and fro between the Teeth, and the fluctuating windings and turnings of the Throat. This motion is natural and voluntary: For Discourse or Speech is an expression of an action of the Soul, to wit, of Thought: But this Thought cannot be outwardly made manifest, without the command of the Will, or the strength or weakness of the Imagination.

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is caused by the motion of the Vapors in the compressed air of a chest for given in pressure

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The dilatation and contraction of the Lungs, as also the action of the Muscles of the Breast serve to the formation of Speech, and a Voice becomes sweet and harmonious, when the Lungs and the aforesaid Muscles act methodically, as also when the Air is duly reflected, repelled, and interrupted by the passage and turnings and windings of the rough Artery, and where the Corpuscles of this Natural little Tongue are less rough and more free from strange Bodies. The Diaphragm, Stomach, and Belly move when we speak, and follow the motion of the Lungs, and the Muscles of the Breast.

The Pulse is nothing else but a percussion of the Arteries, upon the variety of which, the difference of Pulses depends. The Cause of the Pulse according to *Aristotle*, is the Natural heat of the Heart; according to *Galen* it is the moving faculty; according to *Harvey*, this motion of the Heart, and Pulse of the Arteries depends upon the circulation of the Blood, which we will examine in the next Chapter.

Breathing comprehends two actions, Inspiration, and Respiration, by the action of the first, the Lungs receive the external Air, and by the help of the last they



they drive it out. The first is made by a dilatation of the Lungs and Breast, as also by the motion of the Diaphragme, by which the Lungs are opened like a pair of Bellows, and are by that means filled with Air, the second is made by a pressing downwards of the Diaphragme, by which the Lungs are unlocked, and the Air driven forth.

Breathing conduces to the tempering the heat of the Heart, and to the exciting and preserving Natural heat, besides it conduceth to the forming the Voice, to perceiving Smells, to expelling Excrements, and dissipating the fumes of the Blood, and lastly to produce vital Spirits, in promoting their motion, by which it happens that we dye when breathing ceaseth, or when we take our last Breath.

## C H A P. XVII.

### *Of the Motion of the Heart.*

**T**HAT I may rightly explain the motion of the Heart, I suppose it is moved by two different motions, the first of which is Natural, the second against Nature. That resembles the motion.

by this last general the heart is moved with the blood & its residue aspiration & exhalation & of heat.

from the inspiration.

tion of Machines and Clocks, which are moved by help of Strings and Wheels. So the Heart is the principal and chief Wheel of this animated Machine, and moves and drives on all the others, and takes its motion from the weight and impression of certain Fiery and Cœlestial Atoms, which like the Silk-Worm are shut up in the Seed and its covering, and which give motion to it, until they fly away from it, which flight of the Atoms Death follows, and an end of motion.

The Authors of the circulation of the Blood, deduce the motion of the Heart, from the Bloods entring into it, saying that the Heart is opened by the motion commonly called *Diaſtole*, the Blood entring into the Heart; and that by the motion commonly called *Syſtole*, the Blood returns back, and this returning, is the Cause of those two motions; but it is more reasonable to say, that the motion of the Heart hath its Principle in its self, for it is Vital, and the passing through of the Blood is rather an effect than a Cause of this motion, for the Heart opens it self before the Blood enters in, nor does the Blood go out, but as it is driven by the opened Heart.

The second motion of the Heart is accidental, and against Nature, and proceeds

are proceeds from the intemperies of the Blood  
 els. that passeth through the Heart, and  
 chief which impresseth this febrile motion,  
 and whether as being more hot and subtile  
 and than it should be, or having certain fo-  
 m- reign Corpuscles mixed with it, or being  
 A- too thick and viscous, or else offending  
 nut in quantity, it overwhelms the Heart;  
 and hereupon depends the difference of  
 nd motions, contrary to Nature, as also  
 dye the difference of Pulses and Feavers; from  
 ms hence proceeds the palpitation of the  
 he Heart, intermitting Pulses, Convulsions,  
 rt, Suffocations, and sudden Death. And it  
 ng is commonly said that the Life is in the  
 on Blood, nor does any thing hinder why  
 od we should not say that Death is in it  
 he too, when it is corrupted, or very sharp  
 he and corroding, or unfit for motion, and  
 g, containing such like Bodies as lie hid in  
 ut Venoms and Narcoticks.

The motion which is observed in the  
 Hearts of Animals taken out of their  
 Bodies; as for Example, that of a Viper,  
 which continues a long while, does not  
 ct disanul Circulation, but only lets us see  
 ne that Circulation is not the Cause of the  
 n- Natural motion of the Heart, and if you  
 ut stretch it never so far, it is only its con-  
 c- dition which makes it continue, and  
 o- keeps the same in its Natural state.

Whatsoever we say concerning the Heart and its motions, does not make up that Idea which we conceive in our mind, nor does it satisfy the mind of the Reader, who expects we should explain from whence this motion of the Heart while it is in its natural state proceeds, and what is the Cause of its immoderate motions.

That I may therefore satisfy the Reader, I Affirm the Natural Motion of the Heart to be in the motion of the Vital Spirits, shut up in the central Vacuum of the Heart, where they are detained by little Membranes, made firm by the interweaving of Fibres, and of thin threads, so that they cannot escape out, since the Pores of these membranes have a Figure opposite to the Pores of those Spirits or Vital Atoms: And seeing that Atoms enjoy an actual motion, and which can no more be separated from their Essence, than Intelligence from an Angel or separated Soul, or the Inclination from the Will, it follows, that they are always in motion, and by their motions by turns dilate the Heart.

This Doctrine supposes what has been said of Vital Spirits, being as it were the internal Principles of Life and Motion, as also of the essential and proper motion

motion of Atoms, and of Bodies compounded of Atoms; but it is convenient that we remember that we have said, that *motion is Natural to Atoms*, and that God who hath created them essentially moveable, preserves their motion and moveable Nature in the same action that he Created them.

Besides it may be convenient to remember, that there are such a sort of Atoms which may be detained, and constitute the parts of a Compound Body, and others, which are not Naturally such, yet may be shut up, such as those are, which we have said are shut up in the central Vacuum of the Heart of Living Creatures: And these indeed are shut up by the decree of the Creator, and the determination of the seminal covering.

The Comparisor of an Angel, and the Rational Soul seems to contribute much to the illustrating this Doctrine. An Angel is a certain indivisible, spiritual thing, and an Intelligence free from Matter; and the Rational Soul is no less a certain indivisible Spiritual thing, endowed with Understanding and Will as an Angel, yet they differ in this, that the Soul is confined, or, as being a part of the Compound, can be confined by a material Body, whereas an

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Angel

*There alone Caloric is shut up in  
Lime until, & after release*

Angel neither is nor can be confined, which notwithstanding does not hinder but that it may be shut up into a Body, as it were an assisting Form, yet it hath not any respect to an internal and substantial Form. Besides I look upon an Angel, and consider it under the notion of Atoms naturally free, and the Rational Soul under the notion of those which are subject to confinement. It is true, that a Rational Soul going out of this Dungeon or Physical Prison, by reason of the Corruption of the Body, which permits it a free exit, is like to an emancipated Atom, which being free from the bonds of the Composition, never returns thither again, unless that be restored to its pristine, or to a better condition.

CHAP.

## C H A P. XVIII.

*Of the Irregular Motion of the Heart,  
in Animals, and of Feavers.*

**I** Cannot but say something of the inordinate motions of the Heart, stirred up by divers Feavers, and from that Occasion, discourse of the difference of Feavers, their Causes, and Remedies.

Feavers are either Diary, (*viz.*) an inordinate motion of the Spirits which are agitated and disturbed by emancipated Atoms; or they are Hædick, which attack the Fleſhy and Solid Parts: And these Feavers are excited by emancipated Atoms, which insinuate themselves into the substance of our Bodies, and are the Cause that the Corporcles of the Radical Moisture are driven away, and exhaled; by reason of which, the Body is sensibly dryed.

The other Feavers consist in the Humours, and in their fermentation and ebullition, and when this fermentation never remits, the Feaver is continual; where it keeps its periods by turns, it is an intermitting Feaver, and it is

called either a Quotidian, where it comes every day, or a double Tertian, or Quartan, as *Phlegme*, *Choler*, or *Melancholly* predominate. When it comes one day and not the next it is a Tertian, when it remits for two days it is a Quartan, when it rages for two days together, and remits the third, it is a double Quartan: And all these Fits, or redoublings, are owing to emancipated Atoms, or relaxed Corpuscles, which provoke, move, and stir up this or that humour, which cannot be done without an agitation of the Heart, and a manifest Pulsation of the Arteries.

That which in this Subject is difficult to be explained, consists in the regular Fits and intermission of Fevers; that is to say, what is the beginning, and what the Cause of this Flux and Reflux, and of this periodical Motion and State of Rest, and how it comes to pass that *Phlegme* ferments daily, *Choler* but every other day, and *Melancholly* after two days of rest.

Physitians say this motion proceeds from the diversity of humours, and that *Phlegme* has its motion and fermentation every day, *Choler* every other day, and *Melancholly* every fourth day.

*X* nature - as a diff supply  
 heat to the Pleura & the Lungs



day. But the Physical Philosopher examines this difficulty more nearly, and the Sick Person has reason to rest satisfied, when the Physitian knowing the Quality of the Feaver, administers Remedies which evacuate the offending humours, and prohibit the generation of the new; and by this means, the Cause being taken away, they raise him up, and restore him to health.

The Physical Philosopher who enquires into the true Causes of the motions in Nature, and does not like the Physician precisely respect the Health of this or that Person; but endeavours to discover the truth of all things, supposeth first, that there is no humour in our Bodies which goes on from Rest to Motion, unless it be stirred up by some Agent and Mover. So it is questioned, what may be that Principle by which Choler after twenty or twenty-four hours rest is stirred up, and what should excite the fermentation of Melancholly, after it has sat down quietly and unmoved two days, or thereabouts.

Physicians who are truly Philosophers, and ought to be so, teach us, that in a Cachochymick Body there is always a new generation made of these sort. of humours,

mours, and when they are already arrived to a due state of plenitude, some sooner than other some, and sometimes where there is a complication, many of them go on together to a fermentation; and that all this proceeds from the different Nature of humours, and their more easie or more difficult motion, as also from a greater or lesser quantity of one or more humours.

But it may also be asked, what is the Principle of this agitation or fermentation in that State of Plenitude, and for what Cause these Febrile motions are so very regular and periodick? Here, and every where, we will speak *Bona Fide*, and without a Fallacy, and say according to our Principles, that the Atoms asserting their Liberty, with every dissolution of the Aliment, Chyle and Blood, as we have said elsewhere, do by their sharp-pointed Figures tear the Internal Membranes and Tunics of the Stomach and Intestines, as also excite those horrors and tremblings at the beginning of the Fit, and which are longer, or shorter, and more, or fewer, according as their Figures are more or less aculeated and rugged, or smooth and orbiculate.

According to this Principle we may  
say,

say, that the Atoms, from the first digestion of the Stomach challenging to themselves a Liberty, and being weary of the covering of Phlegme and Salt-water, do daily stir up this agitation; but those, which in the dissolution of Chyle, withdraw themselves from servitude, and which abound with a Sulphurous Water, which we commonly call Choler, do stir up a motion more slow by a day than the former, and as many as are emancipated after the third Concoction and dissolution of the Aliments, and are wrapped up in adust Blood, or that black Excrement which they call Melancholly, do produce this Febrile motion two days slower than the first, according to these different dissolutions.

Where we must first of all take notice, that the shakeings in the motion of these differing humours are not equal, nay, not in the very Fits of one and the same Feaver, proceeding from one and the same Cause, but which hath different degrees of activity: To which thing, besides what we have said, the Quality of the Food given to the Sick Person in the time of the intermission doth much contribute.

Secondly, the Fits of one and the same Feaver are not so very regular,

but that they frequently are perceived sooner or later, as the Atoms the disturbers of Health are sooner or later set at liberty. To which thing the regimen of the Sick persons manner of Living does not a little contribute.

Hence it follows in the Third place, That the true Remedy of intermitting Feavers doth consist, First, in an order of Living. Secondly, in an evacuation of peccant or strange humours, which hinder, retard, or interrupt, or precipitate the digestion of Aliments; which must be well observed by an experienced Physitian; and Lastly, the Parts which serve to the first Concoction are to be strengthened, because their faults and defects can never be corrected afterwards.

Moreover if it shall happen that there are some emancipated Atoms, as without doubt there are more or less of them in all Bodies, they are to be expelled by transpiration, or their Figures to be inverted by Remedies called *Febrifuges*. For Experience teacheth us, that there are some of those sort of Remedies very profitable, which are administered with extraordinary good success, and which are not fruitlessly

lessly administer'd by me : And I have now some of these sorts of Remedies found out by me, and administered, which in one day have Cur'd the Quartan and double Quartan. I speak the truth; but I should injure the truth, if I should go so far as to say that my Remedy is infallible : For truly I believe, and not a few of the most eminent and ablest Physicians of the Faculty in *Paris* are of the same Opinion with me, that there is not a Remedy which can be called infallible and made publick. Of which thing, in the occasion of the fermentation of humours, I will a little more specially treat in my Philosophical Reflections, which in a little time will see the Light.

I only add this here, that the Heat which follows the shakeing, does proceed from an agitation of the Spirits, stimulated by the violent motion and repeated stroke of the emancipated Atoms, which are at last expelled through the Pores of the Body, as the Rebellious Angels were thrown out of Heaven by the more powerful good Spirits.

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## CHAP. XIX.

*Of the Circulation of the Blood.*

**A**S many as have delivered themselves from the prejudices of Antient Physick, and Vulgar Philosophy, have taught, after *Harvey*, That the blood in our Bodies is moved in a circular motion, from the extream parts to the Centre, and not from the Centre onely to the extream parts, as was heretofore believed. X

*Gassendus* does not disapprove this Opinion, although he does not embrace it, for Reasons alledged in a particular Treatise set forth by him. I use his Reasons to establish it, as being better founded in Reason, and more agreeable to the disposition of the Veins and Arteries. Let us see therefore how the Circulation of the Blood is made, according to *Harvey*, and the most Learned Physicians. The Blood, say they, passeth into the Heart, from the *Vena Cava*, and *Arteria Venosa* by two Valves, where they are ended, and as often as the Heart dilates it self, a drop of Blood falls into each of its Cavities; and as often as the Heart contracts

contracts it self, the Blood passeth into the Lungs from the right Cavity, through the *Vena Arteriosa*, and from the left Cavity, into the *Aorta*; so that the Blood is moved from the extream parts of the Body, to its Centre, into which it is carried by the *Vena Cava*, where it exonerates it self in the Right Cavity, from whence it passeth into the *Vena Arteriosa*, and drives on the Blood which is contained in that, through Anastomoses already discovered, and through Pores less sensible into the *Arteria Venosa*.

And as much Blood as the *Arteria Venosa* hath received, so much of it deposits into the left Cavity, from whence passing into the *Aorta*, it is carried into the extream parts of the Body, through Branches which go to the Branches of the *Vena Cava*, from hence the Blood being brought into the Trunk, continuing its journey by the same way it returns to the Heart, and by the same reason as I said, it wonderfully and without intermission performs the Circulation.

This Circulation of the Blood relies upon some Experiments, the first of which, is taken from Blood-letting: For *Chyrurgeons* when they Bleed a Vein,

*the ...*

Vein, tye the Arm above the Orifice, and if they put their Finger upon the Vein on the other side of the Ligament, the Blood is stopped immediately : From whence it is apparent, that it comes from the extremity of the Fingers to the Trunk, and not from the Trunk to the extremity of the Fingers, but by Circulation, of which we are discoursing.

The Second Experiment is made, if a Vein be tyed in a part of the Body, separated from the Artery : for it will be emptied on that side towards the Trunk, and it will be swelled on the other side ; on that side, that is to say, from whence the Blood according to this Opinion ought to proceed.

There is nothing therefore so certain as this Circular motion of the Blood, and its passage into the Heart, but here are three things to be observed. First, that the motion of the Heart does not depend upon this Circulation of the Blood, although it conduce to its conservation and inordinate motion, as this Circulation is made more or less hastily, and as the Blood is more or less temperate in the disposition of its particles, and  
in



in its saline ferofities which serve for a vehicle to it, and render it more fluid.

Secondly, that the Circulation of the Blood as the Moderns indeed will have it, may be performed three times in an hour, yet so that all the Blood does not enter into the Cavities or Ventricles of the Heart, as not once every hour, but either sooner or later, according to the greater or lesser quantity, or greater or lesser subtilty or mobility of the Blood.

Thirdly, I say, that the Blood in some cases, cannot pass out of the Arteries into the Veins, through the extremities, that is, when the extremities are cut off; in which Case, it goes on another way, through insensible Pores, which they call Transpiration, or Transudation.

CHAP.

## C H A P. XX.

*Of the Inward Senses, and the Inferiour Appetite.*

**B**ESIDES the exteriour Senses of which we have spoken, there are also found to be in Man interiour Senses, ( to wit ) the Imagination, common Sense, and Sensitive Memory. The first forms a lasting Image of Objects.

The Second judgeth of the agreeableness or disagreeableness of them.

The third retains and preserves these Images or Ideas; which is manifest in X Dogs, who represent to themselves persons absent, and distinguish both between the good and the evil that hath befallen them, witnessing that they remember the thing by running away if they have an opportunity, or by Fawnings.

Appetite follows the interiour Senses, and is common to all Animals, and which is performed by the weight of Atoms, whereby it comes to pass that an Animal hath a propensity, and is driven to seek for that with which it is delighted, and to abstain from that

*Ulysses Dog*

which

which might bring trouble: So that Delight and Pain are the two great importances of the Life of an Animal. Pleasure according to the Opinion of *Epicurus*, depends upon Corpuscles which have a soft, round, and agreeable Figure, especially to the Brain, as to which the Object is represented by the imagination, and from which it is carried by the Senses: Pain on the contrary, and both of them are performed by those Corpuscles, whether they come to, or go from, or continue.

In Morals, we will speak concerning these Passions, as the two Scales of sensitive actions; in the mean time I may here say, that the interiour Senses receive these Corpuscles, which bring pleasure or pain by the ministry of the exterior Senses; from whence it comes, that those that Sleep, or are Lethargick, or Apoplectick, feel nothing, though they are pricked: For the Brain is filled with strange Humours, which hinder the motion of the aforesaid Corpuscles, or else that motion is stopped by Vapours, brought from the lower parts to the Brain, which happens to those that are asleep.

CHAP.

## C H A P. XXI.

*Of Sleep, Wakefulness, and Death.*

**S**LEEP is the Image of Death, for all the Senses are at rest, nor is there any motion left but that of the Heart, Lungs and Arteries; this Rest proceeds from Vapours arising out of the Stomach, which by their clammy-ness, humidity, and viscoufness, do stu-  
pify the Animal Spirits, and Sleep is sweet or restless, according as those Vapours are sweet, or abound with Corpuscles, or are stirred up from Choler, or other things of an irregular Figure, or where some emancipated Atoms make the disturbance.

The mixture of these Atoms is often the Cause of *Light-headedness, Madness, and Hypochondriac Melancholly*; and they likewise produce watchfulness, by an inversion and confusion of the Ideas in the imagination; from whence it happens that we see that which we never see directly; and sometimes Monsters and horrible things.

This motion of the Images or Ideas is sometimes so very violent, and there

is so great a Troop of these emancipated Atoms in the Brain, that those that are asleep, do sometimes rise out of Bed, Talk, climbe up Walls, Bathe themselves, and then go to Bed again, without ever waking all the while.

Death is commonly called a perpetual Sleep, and in Animals (excepting Man) it is nothing else than a total dissipation of the Vital Atoms, or a cessation of motion, in which their Life consists. In Man these things are not after the same manner, although however all these things cease in a dying Man, either immediately, as in a violent Death; or by degrees; as in a Natural Death; we must confess nevertheless, that in that respect something else is to be accomplished, to wit, the separation of the Soul which God gave him, and which returns unto him that gave it.

Before we go any further, and that we may make an end of this Chapter, and be as good as our Word, I am forced a little more specially to discourse concerning the Death of those things which have Life: For whatsoever is Created and Compounded of many Parts, and Liveth, is subject to Death.

Man, who is Compounded of a material and Organical Body, like other Beings,

Beings, dyes at last; but because he hath an immortal Soul Created after the Image of God, he only dyes that he may live Eternally with God, if he be Faithful; and his Death is no more than Sleep, and a passing into Eternity.

What a Christian Philosopher ought to think of this Soul I shall declare in the last Chapter of this Book: Here I will say something of his Body, as also of its Corruption and Dissolution. The Rational Soul never goes out of this Mortal Body before the motion of the Heart is stopped; this motion, which is not voluntary, ceasing, Life can no longer continue, since it consists in this motion.

If the Rational Soul was only in the Brain, as *Duncan* and some others will have it, it would be hard to tell why it should depart, upon the cessation of the Hearts motion, whilst the rest of the Parts are in good order. As for my part, I consider it in its Spiritual Nature, believing that he must have too mean an Idea of this Spiritual Substance who confines it to the Brain, and to the smallest part of it. That Opinion which affirms it to be present every where in the whole Body, although it operates more particularly in the Brain

and

and Heart, seems to me to be more Reasonable, and for this Reason, the Soul acting in the Heart, the Organ ceasing, it departs in the same Moment.

It may seem a wonder to not a few, that the Rational Soul should so depend upon the material Body, but since it so seemed good to the Author of Nature, we ought to rest satisfied. The Body is endued with Organs for the sake of the Soul, and the Soul is created for the sake of the Body, and one is made for the other, and the Conjunction of these two make a compleat Man. One part onely does not make a Man, nor does a separate Body make up the Essence of a Man; and indeed a dead Man is not what he was, 'till he Rises again. The Soul therefore is annexed to the Body by such a sort of Tye, that it cannot act but by Organs. So that he sees nothing when his Eyes are out, he hears nothing when his Ears are stopt, and the chief Organ being deficient, the Soul departs because it can do nothing.

This Chief Organ, to wit, the Heart, is deficient many ways; it may be stopp'd and suffocated for want of Air and respiration, for the Atoms of Light implanted in the Heart at the time of a  
Man's

Man's Conception, (the commerce of the Solar Spirits being intercepted for want of Air,) do sometimes suddenly stand still, they flye away, finding a passage through a solution of the continuum, or through Pores made fit by a burning Feaver in the Heart, all the Water of the *Pericardium* being dried up: Thick and viscous Blood does sometimes stop the motion of these Vital Atoms. Poyson also does by its acute Particles pierce through the Heart, and give an exit to these Spirits of Light, which are tyed to those which the Sun bestows upon us, and are attracted by them, returning thither from whence they came.

Let us see now what the Body does in the Grave; it putrifies there, that is, it is dissolved, some Corpuscles or Atoms withdraw themselves, some part of the Body is changed into Worms, some of the Vital Spirits resisting. It is a folly here to imagine any substantial form of the Dead Carcasse, or to acknowledge partial forms of the Bones, Flesh, Veins, Arteries, and such like things, Subjects to the form of the dead Carcasse, or alone without this Form. These are Illusions and Chimera's. Matter is the same, and all the change that happens, consists



of consists in this, That when the Rational Soul is absent, there remains nothing besides matter; the Organs by little and little lose their Figure, and having lost their Composition, they lose their action, that which was compounded is dissolved, and the greater part goes into Dust and Ashes; the Luminous Spirits recede, and follow the motion of the Spirits of their kind: some Parts or Corpuscles joyned to the putrifying Body, putrifie in the place where they are: Experience favours this Doctrine.

A certain Servant to a Noble-Man, whose Nose had been by great misfortune newly cut off, freely parts with his own Nose to serve his Master. This Nose being put in the place of that which was newly cut off, took Root, and grew together, after such a manner, with a Cartaliginous Flesh, that it seemed to be Natural. About twenty years afterwards, the Servant dyes in a far Countrey, and was Buried, and as by degrees he putrified, so after the same manner, this end of a Nose began to putrifie, to be corrupted, and to fall off, parting from that part to which it had so long stuck without withering, whilst the Servant lived, the part following the

the condition of the whole.

I say moreover, that the least parts or Corpuscles which proceed from a Body, the Body being Dead and Corrupted, they also are Corrupted, and joyned in commerce with Atoms of the same Nature, which they do, by inviting them to joyn and come together.

And here's an Experiment which every one can understand. It is very well known, that he that puts on a Garment, or touches it, leaves upon it his Scent, that is, Corpuscles which proceed from his Body, and which constitute part of it; and by the help of these Corpuscles a Dog is able to know his Masters Handkerchief, Hat, or Garment from ten thousand others. This being supposed, if the Dead Man's Garment or Cloak be put into a Press or Chest, first, and for some days, when the Body that is Buried begins to putrifie, there will be a considerable noise and disturbance in the Press or Chest, enough to frighten Children, and other folks too, and the Corpuscles of the dead Body being attracted by those that are going away, by their motion make this noise among the Cloaths: And whereas this attraction is made in a streight Line, and these Corpuscles cannot pass through the  
Bords

Bords, but obliquely, the Wood suffering violence, makes a noise as if it were crackt. Any one may trye this, and know whether this Experiment made by others be true or no : I see no reason to doubt of it : From hence appears that invisible Bond of the Parts with the Body from whence they did proceed.

A third Experiment may be made, which will serve to the illustrating this Subject. Take a piece of Veal, or any other Flesh from the Shambles, and with it rub the Warts of any ones Face or Hands, then afterwards sling it upon the Dunghil, or Bury it, and as that putrifies, the Warts will fall off, which denotes that the Corpuscles of Flesh returning to their *whole* or greater part, and being violently attracted, do in the same manner attract the Warts, and make them go away, which some Learned Men say they have Experienced.

We may admire in all these things the Providence of God, who hath Created Atoms, and out of them hath compounded the Universe, wherein we find so great a number of wonderful things, which are the subject of our admiration, and convince our Ignorance.

## C H A P. XXII.

*Of the Death of Brutes, Plants, and Mettals.*

**S**Eeing that Man dyes, other Animals cannot escape Death; let us see wherein it consists.

The Followers of *Aristotle* are very much puzzled in explaining the Death of a Dog, for when it is destitute of all Sense and Motion, it is dead without doubt, yet in the mean time it hath all its parts and Organs. What therefore happens to this Animal? Its Soul is separated from its Body, say they, and the Spirit of Life is not in him; they do the Beast much honour who speak thus in his Favour. But what becomes of this Soul? Is it corrupted or annihilated; or does it subsist apart in some other place, or is it taken into some other Body? No, by no means, say they, it is not, it is destroyed, and that's sufficient. So it is sufficient to People who don't seek after the Truth: For if this Soul be a substance as they say it is a material one, it is impossible but it must go into some other thing, or else be reduced

duced into nothing. It is reduced into nothing say they; therefore it is annihilated, therefore it is Created and made out of nothing, which is Ridiculous, and unbecoming a Christian Philosopher. It is true, this Opinion is very common in the Schools, but this Errour is detected, and they who are wiser than others, say with us, that the Spirits of Life, or Corpuscles of Light being altogether dissipated or hindred in their motion, do withdraw and return to their Original, and Copulate with others which are in the Air, so dyes a Dog, without the loss of that which God made; the Parts are separated, the Spirits seek the Air, the Body the Earth.

Plants dye like other Living Creatures, but their Death very much differs from the Death of Animals, for as much as their Organical Parts do not appear so as they do in Animals, nor does a Plant dye so easily as an Animal: For a Plant is not dead so soon as it is pulled out of the ground, its Life continues to the extream dryness, or evaporation of the Radical moisture, which contains all the Spirits of Life; and though the Plant be caldined, or burnt to Ashes, part of the

Spirits will remain in those Ashes; for the Lixivium that is made, or the Salt that is extracted, gives all the Savour of the Plant; and where that Lixivium is congealed by the Cold of the Night, the Figure of the burnt Plant will appear in the very Ice.

But what is more to be observed, is, that a Plant dryed in a Kilne, and put into a particular Water whose Virtue is Universal, receives its pristine Greenness, Leaves, and Flowers; without doubt in this dryed Plant some Vital Spirits were shut up, which are relaxed by the Spirits of this Water, or the Vital Spirits exhaling, give way to the Spirits of the Water we speak of, to take their places. This Water is endued with Vital Spirits, which can fill the place of those that exhale in us, and with this sole Remedy Life may be prolonged, and the losses of ruined Old-Age be repaired, by filling up the Vacuities of the radical moisture which is dissipated. But you will say, where is this Water, it is to be found in Light, according to our Principles, and certainly nowhere else. This Water is the true *Elixir-Vita*, and the Universal Medicine of the Antients, and it is meet that we use it to the preservation

ervation of the most Sacred Persons.

Mettals have a more abstruse Life than Plants, nor is their Death more conspicuous: Their Life consists in a certain disposition of Parts, which permits a free motion to the Atoms of Life and Light. This is the State of Mettals in their Mines, and when they are melted, this Liberty is lost, by the intervention of the Atoms of Fire; and when after melting they grow cold, they may be called Dead, for they are deprived of motion, nor do they perform any action. Gold melted when it is grown cold is dead; it Lived in the Mine, it is dying whilst it is melting, and it is dead, when cast into Ingots.

In vain therefore do the Chymists seek for the Living among the Dead, Common Gold is dead, and good for nothing but to make Money of; but if any one can dissolve this Body, and bring the Dead to Life again by the benefit of that resuscitative Water which we spoke of before, he may prepare a Medicine, profitable to humane and Mettallick Bodies.

It is said before, that Stones want Life: But this I meant, that they want a Life so notorious as Met-

tals, whose Life hitherto is yet obscure enough ; for I have Learnt being convinced by Experience , that the greatest part of Stones are multiplied, and encrease, according to all their dimensions ; and that Sand is turned into Shells.

And this very thing is the Cause that I conclude, *Light to be the Spirit of Life*, that by the benefit of it all things Live, the very Stones also take their Life from hence, Seeds owe all their Vigour to Light, and seeing that Light is woven out of thin threads of Gold, all things therefore Live by the Spirit of Gold. But the Soul of Man is Spiritual, and a Ray of Divine Light, and owes its Life to God and his Word, as also it is an Immortal Substance, as we shall say in the next and last Chpater.



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